The People's Republic of Bangladesh
MIDI Cell, Prime Minister's Office

MIDI Strategic Vision Development and Economic Impact Analysis

Final Report

March, 2023

Japan International Cooperation Agency (JICA）

McKinsey & Company India LLP

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Acronyms

A

ADB	Asian Development Bank
API	Active Pharmaceutical Ingredients
ASEAN	Association of Southeast Asian Nations
ATS	Advanced Technology Scenario

B

BD	Bangladesh
BBL	Barrel
BEZA	Bangladesh Economic Zones Authority
BIDA	Bangladesh Investment Development Authority
BIG-B	Bay of Bengal Industrial Growth Belt
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BPC	Bangladesh Petroleum Corporation
BPDB	Bangladesh Power Development Board
BR	Bangladesh Railways
BSMSN	Bangabandhu Sheikh Mujib Shilpa Nagar
BPD	Barrels Per Day
BWDB	Bangladesh Water Development Board

C

CAGR	Compound Annual Growth Rate
CCU(S)	Carbon Capture, Utilization (and Storage)
CDU	Crude Distillation Unit
COP	UN Climate Change Conference of the Parties
COVID	Coronavirus Disease
CPA	Chittagong Port Authority
CPGCBL	Coal Power Generation Company Bangladesh Limited
CUM	Cubic meters

D

DGCR	Development Control Guidelines and Regulations
DPP	Development Project Proposal
DWT	Deadweight Tonnage
DCCRPPF	Dhaka-Chittagong-Cox’s Bazar Rail Project Preparatory Facility

DSIRDA	Dholera Special Investment Region Development Authority	
EMRD	Energy and Mineral Resources Division	**E**
EOI	Expression of Interest	
ERL	Eastern Refinery Limited	
EXIM	Export Import	
EZ	Economic Zones	
FDI	Foreign Direct Investment	**F**
FMCG	Fast Moving Consumer Goods	
FSRU	Floating Storage Regasification Unit	
FY	Fiscal Year	
GDP	Gross Domestic Product	**G**
GoBD	Government of Bangladesh	
GTCL	Gas Transmission Company Limited	
GW	Gigawatt	
HDPE	High Density Polyethylene	**H**
HFO	Heavy Fuel Oil	
HIC	High Income Country	
HSD	High Speed Diesel	
ICT	Information and Communications Technology	**I**
IEAT	Industrial Estate Authority of Thailand	
IEPMP	Integrated Energy and Power Master Plan	
IEZ	Industrial and Economic Zones	
IMF	International Monetary Fund	
JERA	Japan’s Energy for a new eRA	**J**
JETRO	Japan External Trade Organization	
JICA	Japan International Cooperation Agency	

JNOT	Jawaharlal Nehru Port Trust	

KAFCO	Karnafuli Fertilizers Company	**K**
KBD	Kilo Barrels per Day	
KPI	Key Performance Indicators	

LDC	Less Developed Countries	**L**
LCOE	Landed Cost of Energy	
LNG	Liquefied Natural Gas	
LDPE	Low Density Polyethylene	
LPG	Liquefied Petroleum Gas	
LUDP	Land Use Development Planning Survey of Moheskhali and Matarbari Area	

MIDI	Moheshkhali - Matarbari Integrated Infrastructure Development Initiative	**M**
MIDI CC	MIDI Coordination Committee	
mmcfd	Million standard cubic feet per day	
MMTPA	Million Metric Tonnes Per Annum	
MoS	Ministry of Shipping	
MoWR	Ministry of Water Resources	
MTPA	Million Tonnes Per Annum	
MW	Megawatt	

NER / NE	North East Region	**N**
NCI	Nelson Complexity Index	
NH	National Highway	

OPEX	Operating Expenses	**O**

PET	Polyethylene Terephthalate	**P**
PV	Photovoltaic	
PVC	Polyvinyl Chloride	

PGCB	Power Grid Company of Bangladesh	
POL	Petroleum, Oil and Lubricants	
PMO	Prime Minister's Office	
PP	Perspective Plan	
PPP	Public Private Partnership	

RHD	Roads and Highways Department	**R**
RMG	Ready-made Garments	
RPGCL	Rupantarita Prakritik Gas Company Limited	
RTHD	Road Transport and Highways Division	

SDP	Sector Development Plan	**S**
SEZ	Special Economic Zone	
SIR	Special Investment Region	
SPM	Single Point Mooring	

TEU	Twenty-foot Equivalent Unit	**T**

UAE	United Arab Emirates	**U**
UMIC	Upper-Middle Income Country	
USA	United States of America	
USC	United States Cents	
USD	United States Dollar	
USCCPP / USCCP	Ultra Super Critical Coal Power Plant	

VAT	Value Added Tax	**V**

WEF	World Economic Forum	**W**

1. Executive Summary

Moheskhali - Matarbari Integrated Infrastructure Development Initiative (MIDI) is an ambitious and futuristic infrastructure project for Bangladesh.

The project was envisioned in 2014 as a part of the visionary Bay of Bengal Industrial Growth Belt (BIG-B) program – a joint effort of the Government of Bangladesh (GoBD) and the Government of Japan to build industrial agglomeration-led growth in the south Chittagong region of the country. Over the last 8 years, MIDI has made progress in getting major infrastructure projects off the ground.

Key statistics

MIDI is planned across Matarbari & Dhalghata unions of Moheshkhali upazila within Cox's Bazar district of Bangladesh across ~20,400 acres[1].

Exhibit 1: MIDI – Key Statistics (Existing Plan)

Logistics Hub

~1,670 acres (~240 acres acquired)

- **~4.9** Mn TEU of Container Capacity
- **16-39** Mn Ton of Bulk Cargo Capacity

Ongoing projects:

- **Port Stage 1 Phase 1** (Exp. 2027)
  1 container berth and 1 multi-purpose berth
- Matarbari Port Access Road from Chakaria (27 km; Exp. 2027)
- Port railway line from Chakaria (38 km; Planned)

Implementation Agency: Chittagong Port Authority

Power and Energy Hub

~10,300 acres (~9,300 acres acquired)

- **~21,700 MW**[2] of power generation capacity
- **~3,500 mmcfd** of LNG import capacity
- **~4.5 MTPA** of POL imports capacity
- **~1 MTPA** of LPG import capacity

Ongoing projects:

- **Coal fired power plant** S1-P1 (1.2 GW, Exp. 2024)
- Matarbari – Madunaghat 400kV transmission line (Near completion)
- Moheshkhali – Madunagha - Bhulta 765 kV transmission line (Planned)
- **FSRUs** (2 nos.; 1000 mmcfd) (Operational)
- **LNG Terminal** (3.8 Mn Tons) (EoIs received)
- **LPG Terminal** (1 MTPA) (Feasibility consultant onboarding in progress)
- **9 MTPA SPM** + Two pipelines till ERL for crude and HSD (>90% complete)

Implementation Agency: Various agencies under Ministry of Power, Energy and Mineral Resources

Industry Hub

~8,400 acres[1] (~3,000 acres acquired)

- Across 7 industrial zones (EZs), targeting various industrial sectors

Implementation Agency: BEZA

1. Excludes EZ 1 (Eco-sensitive zone) - ~12,600 acres (acquired)
2. Coal - ~14.8 GW + Gas – 3.6 GW + Residual undecided

Source: Long-term Land Use Plan from Land Use and Development Planning Survey of Moheshkhali and Matarbari Area Report, 2019 and MIDI Outline, June 2022

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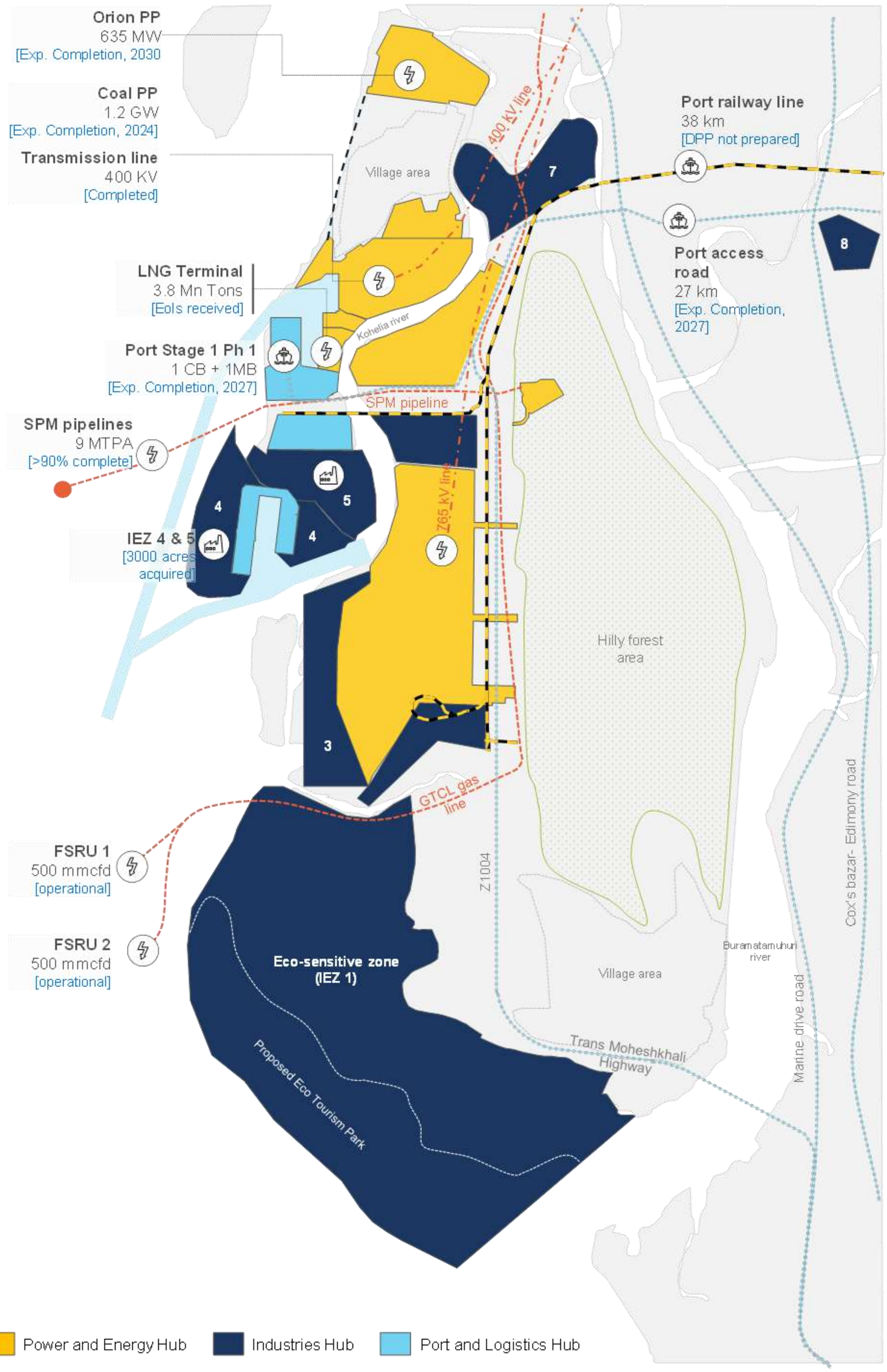
[1] Excluding ~12,600 acres eco-tourism zone, planned as EZ 1 by BEZA

Exhibit 2: MIDI - Existing Land Use Plan and Status of Key Projects



MIDI's Vision 2041:

> **"To build an integrated economic hub for trade & investments, to support long-term vitality & growth of Bangladesh."**

"An Integrated Economic Ecosystem"

The long-term concept of MIDI can be described as:

- An economic nucleus, comprising 3 economic pillars
- Supported by cross-cutting social infrastructure (housing, retail, tourism & recreation, education, healthcare)
- Supported by seamless & well-planned physical infrastructure (connectivity infra like rail / road / pipeline; coastal / disaster management infra like dykes; utilities like water, sewerage & effluent treatment and new-age digital infrastructure)

This infrastructure backbone, supported by robust policy support and streamlined governance structure will ultimately feed into making MIDI an integrated ecosystem, which can support investments.

"A hub for trade & investments"

Driven by its deep-sea port, MIDI will be a hub for facilitating trade in Bangladesh through enabling efficient EXIM movement across commodities.

Further, MIDI will be a new destination for investments, including FDI, into Bangladesh. It will see investments from GoBD, development finance institutions, private sector and foreign investors.

"Evolution over an 18 - 20 years development pathway"

As seen globally, development journeys of large integrated economic developments can be traced across 15-20 years to realize their full potential. MIDI will be no exception.

MIDI's pathway to 2041 could be traced across 3 periods spread over 18-20 years. In each period, MIDI will evolve as an economic hub taking different shapes, positioning and drivers.

Strategic Objectives or "Targets"

In 2041, MIDI's vision could be measured against the following strategic targets:

- **Boost EXIM trade and connectivity**
  by lowering international freight shipping costs by more than 20% and providing direct access to international shipping routes.

- **Bolster energy security**
  being a gateway to more than 50% of national energy supply.

- **Enhance value add in Bangladesh**
  Hosting manufacturing opportunities to reduce reliance on imported finished goods.

- **Generate employment**
  by providing employment opportunities to more than 1.5 lakh people.

- **Boost infra creation**
  by attracting investments, including FDI, in infrastructure over next 20 years.

- **Meaningfully contributing to national output**
  by accounting for at least 6% of country's GDP by 2041.

Strategic Pillars

The Moheshkhali island could transform into a hub for trade and investment in south Bangladesh, strongly founded on **3 inter-connected, strongly rooted economic pillars:**

Pillar 1
Deep-sea Port & Logistics Hub

Strategic EXIM gateway for Bangladesh, streamlining logistics, and boosting regional competitiveness

Pillar 2
Manufacturing Hub

A vibrant industrial hub, capturing greater value - add within Bangladesh through scale and competitive logistics cost

Pillar 3
Power Generation & Energy Hub

Strengthening energy security for Bangladesh through power generation, fuel imports and strategic storage

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Pillar 1: Deep-sea Port and Logistics Hub

The logistics sector is critical for Bangladesh to become competitive in exports and to support its high dependence on imports (for both raw and finished goods). World Bank ranks[2] Bangladesh behind peers like Cambodia, India, Philippines, Vietnam in the Logistics Competitiveness Index, but also estimates that the country could boost exports by 19% if it cut logistics costs by 26%.

One of the biggest barriers to cutting logistics costs, however, is the capacity constraints and inefficiencies at the Chittagong Port – Bangladesh's largest EXIM port (handling ~95% of maritime trade in FY22).

- As a riverine port, Chittagong port faces draft[3] and channel constraints, which limit maximum size of vessel[4] and number of vessels which can navigate into the channel.
- Bulk cargo goes through lighterage at Kutubdia island before offloading at anchorage point[5] outside the river channel. Most bulk travels from anchorage point to hinterland in barges via inland waterway.
- **30-40% more costs and a delay of 1.5-2 weeks**[6] because container cargo comes to Bangladesh after being trans-shipped in feeder vessels (<2,000 TEUs) at Singapore or Columbo (Sri Lanka) or Krishnapatnam (India) ports.

New / proposed container handling capacity at Chittagong will help declutter Chittagong but will operate with similar constraints.

- Patenga container terminal is recently completed and awaiting private operator selection. But it also faces

[2] World Bank (2019): "Moving Forward: Connectivity and Logistics to Sustain Bangladesh's Success"
[3] 8.5-9.5 m, subject to de-silting & tidal variations; As advised by CPA, draft of channel is being increased to accommodate container vessels of 10 m draft and 200 m length during hide tide. This will be ready in 2023.
[4] Max. size of vessel at Chittagong port - 15,000-20,000 DWT & <2,000 TEUs
[5] Anchorage point itself has limited draft of ~11 m
[6] As compared to ~8,500 TEU mother vessels directly coming to Matarbari Port from Shanghai.

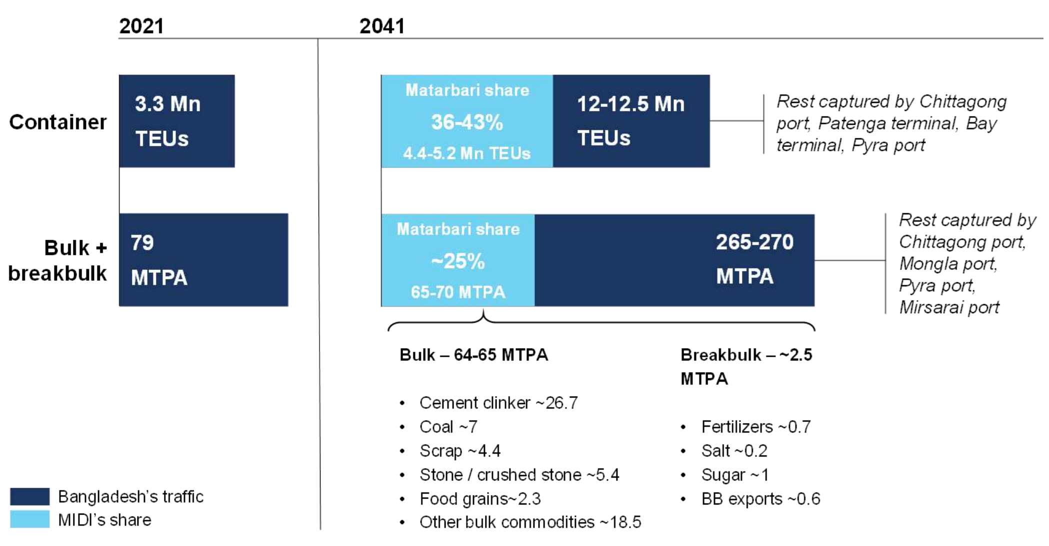
draft and backyard space constraints similar to Chittagong Port.
- Further, Chittagong Port Authority's ambitious Bay Terminal (also with limited draft of ~12 m) project has just completed feasibility. With Matarbari Port coming up, the timeline for this project is not certain.

Matarbari Port will address these challenges and create supplementary strategic infrastructure for future:
- Emerge as the **prime Port of Call in Bangladesh** for large & super large mother vessels (being the only deep-sea port with 16 m+ draft[7]), which then get offloaded into smaller feeder vessels for **coastal shipping to other ports within Bangladesh** (Chittagong, Payra, Mongla etc.)
- Help **increase export competitiveness** of Bangladesh by reducing transport costs and export lead time[8]
- Help **decongest Chittagong Port for container trade**, offering better and more efficient handling facilities.
- **Handle bulk cargo for the Chittagong-Cox's Bazar region**, offering time and cost competitiveness by berthing larger mother vessels and reducing need for lighterage.
- Provide **efficiencies in cargo handling** by offering commodity-specific logistics & warehousing facilities, which are today not available in Chittagong.
- Provide strategic port connectivity for North Eastern India and Bhutan.

25-35%
Potential shipping cost savings at Matarbari

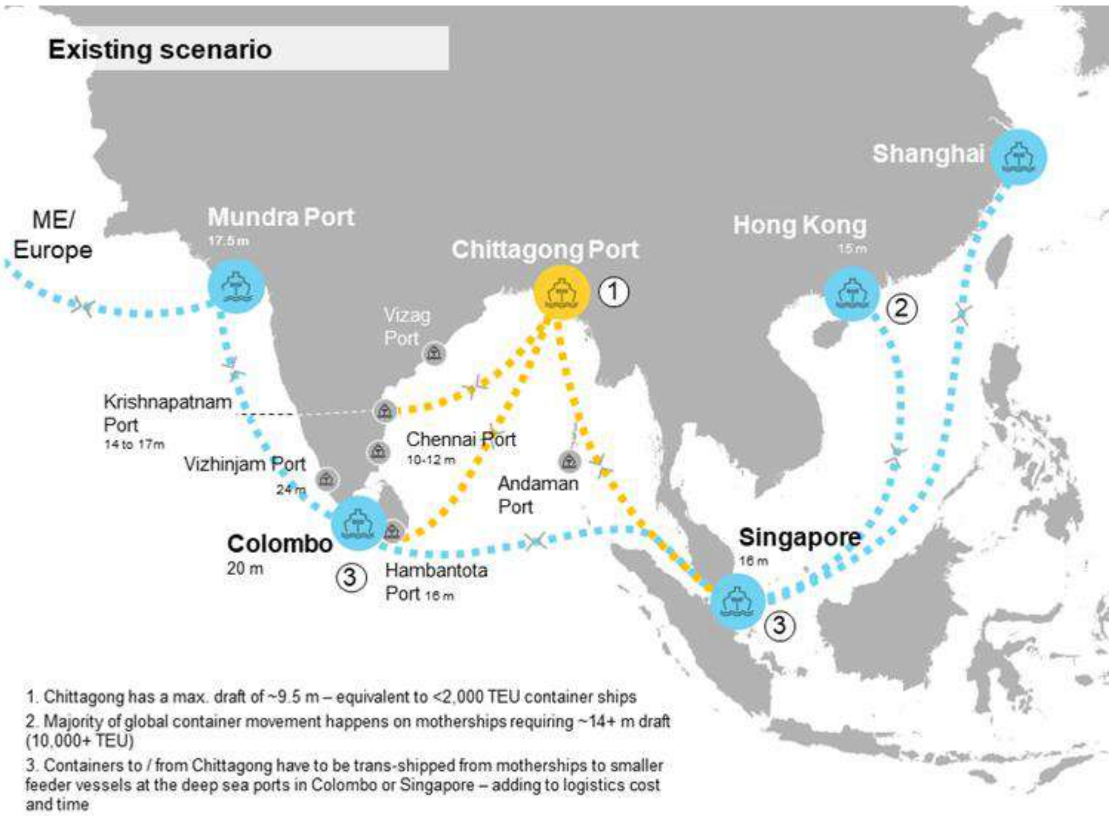
By 2041, Matarbari Port can target ~25% of bulk and breakbulk traffic (~65-70 MTPA) and ~36-43% of container traffic in Bangladesh (~4.4-5.2 Mn TEUs), cementing its position as a critical port in the region.

Exhibit 3: Projected port traffic at MIDI

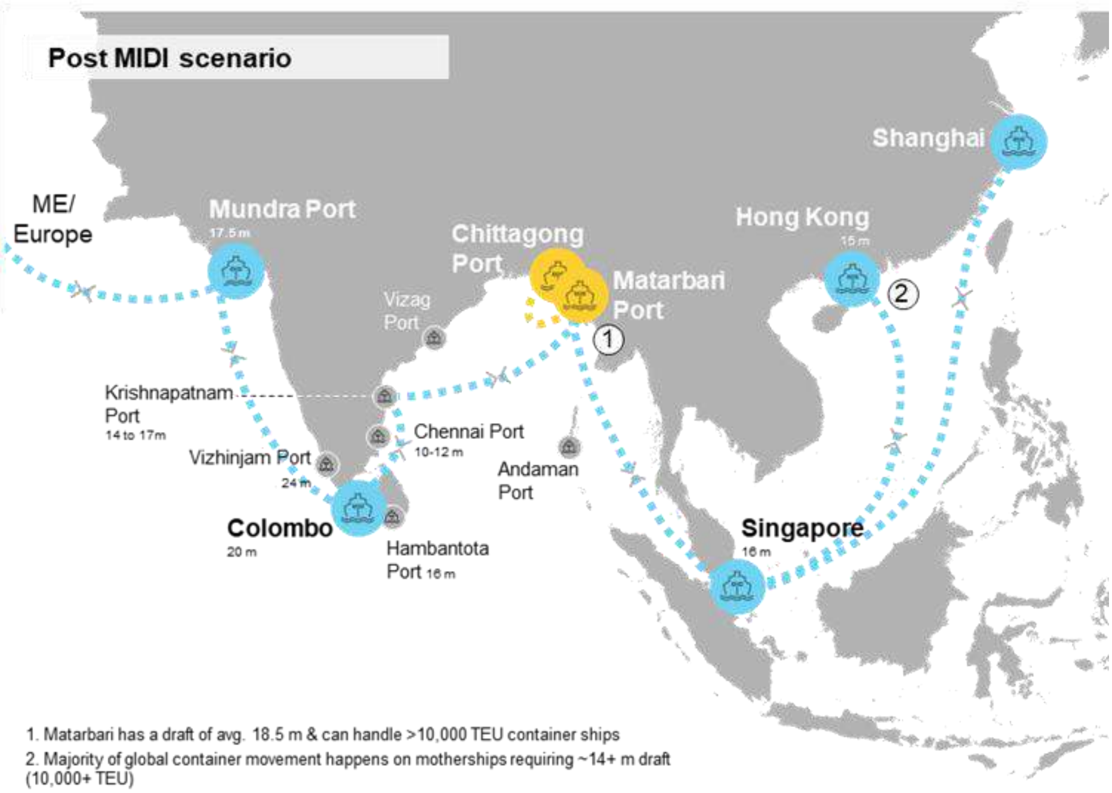


[7] Low tide draft 16 m & average raft 18.5 m; Up to 120,000 DWT (& 8,500 TEU) vessels can be accommodated, as against 40,000-60,000 DWT (& <2,000 TEU) today.

[8] By 25-30 days, as against 110-120 days currently for RMG sector



Container shipping movement



International shipping route   Transhipment route for feeder vessels

Pillar 2: Manufacturing Hub

MIDI's competitiveness in manufacturing accrues from its integrative ecosystem.

- **Logistics cost competitiveness with deep-sea port**
  25-35% shipping cost competitive for bulk and containerised goods.
  Time savings for EXIM industries, with dedicated infrastructure.

- **Availability of captive power and gas feedstock**
  10+ GW power generation within MIDI; import of LNG, coal & oil feedstocks.

- **Possibility of large-scale industries for economies of scale**
  ~8,400 acres across 7 EZs.

At the same time, MIDI also faces some constraints as compared to established ecosystems in Bangladesh.

- **Distance from established consumptions centres like Dhaka**
  This might make MIDI less competitive for consumption driven industries like FMCG, which prefer to be closer to urban centres.

- **Availability of talent / skilled labour**
  MIDI may not be competitive today for sectors like RMG, pharma, leather, which need skilled labour.

Considering these aspects, MIDI's manufacturing strategy is based on evolving as an EXIM manufacturing hub, starting with bulk / material industries and emerging as a key supply hub for Bangladesh. Eventually, MIDI will be able to capture downstream value-add on these sectors.

In near-term, MIDI could target bulk / material industry and be a large supply hub for Bangladesh.
Bulk / material industries, where Bangladesh is import-dependent for raw materials (steel, cement, sugar refining) can benefit from port-proximity and easily attracted to MIDI.

MIDI can pass-on scale benefits and lower logistics costs, thereby reducing cost of bulk goods produced in Bangladesh.

Exhibit 4: Illustration of steel manufacturing competitiveness at MIDI

Long-steel industry in Bangladesh is dependent upon imported scrap from countries like Japan, USA.

As estimated, cost of long steel produced at MIDI's manufacturing hub could be USD ~40 /ton (or ~5%) lesser than existing cost of production in steel plants at Chittagong.

Long-steel cost in Dhaka (USD /ton)

Key competitiveness factors for MIDI:

- Lower transport cost of raw material till factory due to lower bulk shipping cost till Matarbari Port + faster handling (leading to low inventory holding cost)
- Lower processing cost due to possibility of larger scale plant (4-5 MTPA capacity).
- Lower power cost due to availability of captive power at MIDI.

Chittagong may still be the largest steel production hub for Bangladesh, given its existing ecosystem, proximity to ship breaking yard and proximity to demand centre.

But to support the economic growth of the country, steel demand in Bangladesh is expected to grow ~5X by 2041, which will need significantly higher production capacity.

Considering this, MIDI can be the second largest hub, after Chittagong, for long steel manufacturing, targeting 20-25% of the country's demand in 2041.

MIDI could also be a game-changer in select sectors by capturing upstream and downstream value-add opportunities within Bangladesh.

The project's competitiveness could translate into domestic value-add opportunities in sectors like petrochemicals & polymers, edible oil, which are currently import-dependent for finished goods.

MIDI offers possibilities of integrating most of the value chain at single location (e.g., from POL refinery to derivatives to polymer production). This could provide an economical domestic alternative (up to 25% against import costs) to import such products (chemicals, plastic feedstock, soya oil), while also contributing to country's GDP.

In the long-term, MIDI may also attract export-oriented and domestic discrete manufacturing in select segments like consumer durables, pharma, plastic products etc.

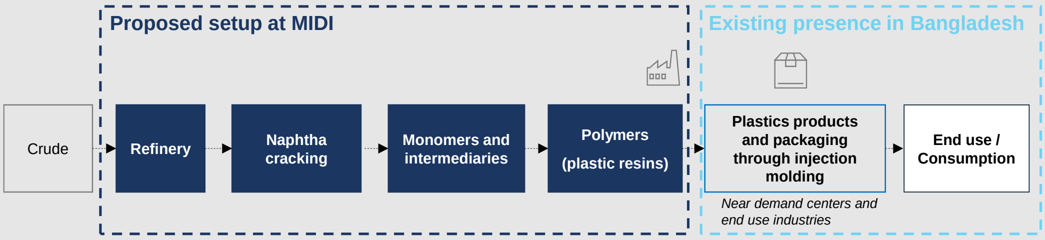
But prospects of export-processing are contingent upon development of a compelling industrial ecosystem at MIDI (which can attract talent pool) and Bangladesh's overall export competitiveness.

Overall, manufacturing hub will be able to utilize ~8,400 acres across the 7 designated EZs for selected focus sectors & logistics play, bringing an investment of USD 18-20 Bn over next 18-20 years. In 2041, it is estimated that, manufacturing hub at MIDI could directly contribute ~10% to Bangladesh's manufacturing sector.

Exhibit 5: Illustration of Petrochemicals & Polymer manufacturing competitiveness at MIDI

Currently almost all plastic polymers demand in Bangladesh is met via imports.

Presence of upstream refining and petrochemicals complex at MIDI will augment the value chain of plastics manufacturing and enable large scale production of polymers from upstream feedstock.



Manufacturing of plastic polymers at MIDI will be competitive because of:

(i) Vertical Integration with upstream refining complex
(ii) Favourable custom duties and tariff structure on import of raw materials viz-a-viz finished products
(iii) Freight cost savings and synergies with deep seaport, making raw materials cheaper.

~15-20%

lower cost of **ethylene** viz-a-viz imports

~20-25%

lower cost of **PVC** viz-a-viz imports

~25-30%

lower cost of **HDPE** viz-a-viz imports

In short term: Reduced transport cost could enable MIDI to become the hub for manufacturing plastic polymers from imported raw materials like ethylene monomers.

In medium-term: Once refinery and cracking units are established, MIDI could become an integrated petrochemicals and plastics ecosystem with production right from petrochemicals to plastic polymer.

In long-term: MIDI could also capture downstream plastic finished product manufacturing for exports & local consumption.

Exhibit 6: Manufacturing strategy at MIDI

Strategy 1

Attract bulk / material industries to become a large supply hub

- Steel
- Cement
- Sugar refining

Immediate focus

Strategy 2

Create higher value add in material industries for Bangladesh

- Downstream petrochemicals and Polymers
- Chemicals
- Fertilizer
- Soyabean crushing & extraction

Immediate focus; diversify into downstream activities eventually

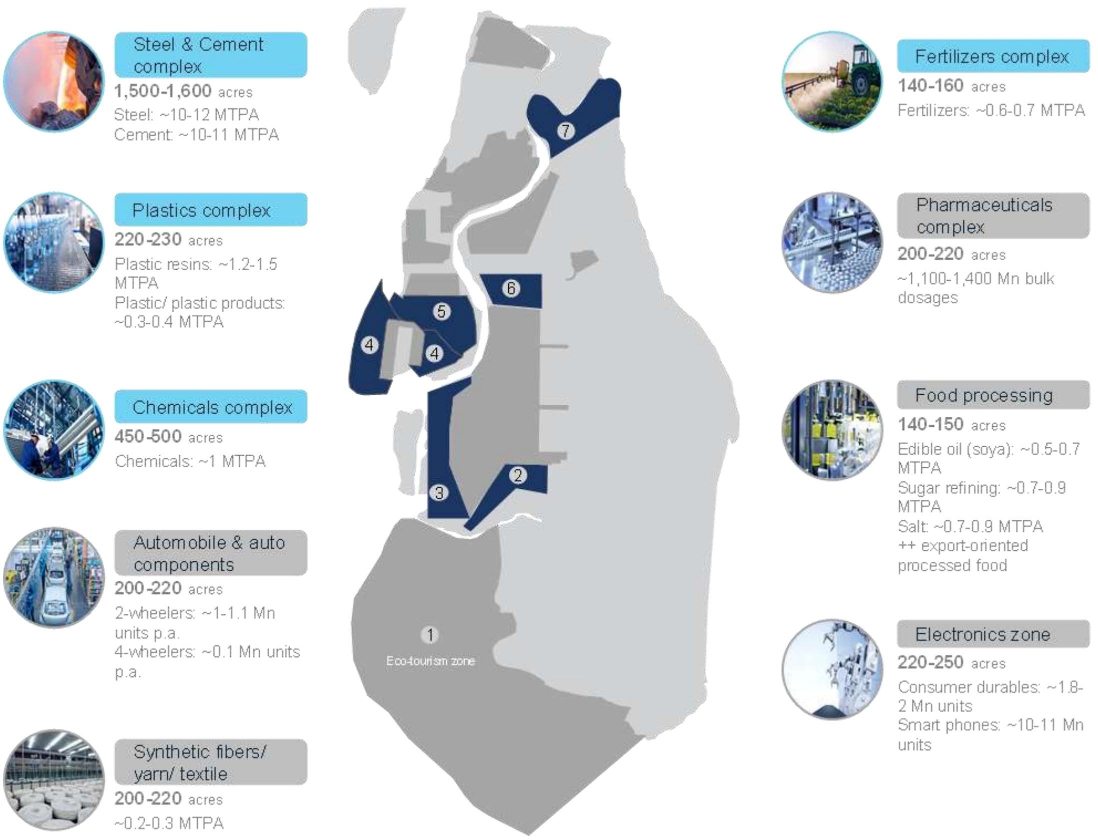
Strategy 3

Diversify to export-focused value-addition

- Automobile assembly
- Consumer durables
- Plastic products
- Artificial Textiles
- Pharmaceuticals
- Small ship-building

Mid-long-term focus

Exhibit 7: Manufacturing sectors at MIDI



Pillar 3: Power Generation and Energy Hub

Energy security is a key concern for Bangladesh. Country's import dependence for LNG, coal and oil has increased like never before and is expected to grow in coming future.

Fuel shortages and price volatility in last few years has impacted various segments of the economy, most evidently the manufacturing sector, which needs LNG and coal, both for feedstock & power.

Hence together, energy imports and power generation constitute a powerful pillar for MIDI's vision 2041.

MIDI will be a strategic part of Bangladesh's energy security plan.
MIDI has a strategic advantage because of deep-sea port & land availability and hence would be a natural choice for fuel imports for Bangladesh.

Further, it can address Bangladesh's concerns on global price & supply volatility, by providing strategic energy storage / stockpiling solutions.

Across energy sources, MIDI can cater to a bulk of country's energy imports.
The analysis shows that given its competitiveness, in 2041, MIDI can take up ~2,000 mmcfd LNG import & regasification, 2 MTPA LPG imports and 15-20 MTPA of POL imports.

MIDI's power generation portfolio, originally pegged at ~20 GW (out of which ~15 GW was coal), is expected to be revised to 10-15 GW.

This will be distributed as 1.8 GW in coal, 8-13 GW in LNG and ~200 MW in solar. In aggregate, by 2041, MIDI will have an installed capacity equivalent to ~20-30% of Bangladesh power demand.

A substantial portion of land has already been acquired by power division of Ministry of Power, Energy & Mineral Resources. Further, 1.2 GW Ultra-Super Critical Coal-fired Power Plant Phase 1 (owned by CPGCBL & funded by JICA) is nearing completion and expected to start operations in 2024.

In future, MIDI's power hub could also support Bangladesh's clean energy plans by transition to technologies like CCU and hydrogen co-firing in the proposed coal & LNG power plants.

Finally, POL refining at MIDI could be an import-substitution opportunity for Bangladesh.

Bangladesh's oil product demand is expected to expand 4.8-folds between 2019 and 2041. Due to limited refining capacity, Bangladesh has been historically importing refined products at a premium to meet 70-80% of its total refined demand. A 8-10 MTPA capacity (160 – 200 kbd) will support ~35% of total product demand by FY41, while helping to reduce Bangladesh's dependency on costly product imports.

Risks and challenges to 2041 aspirations

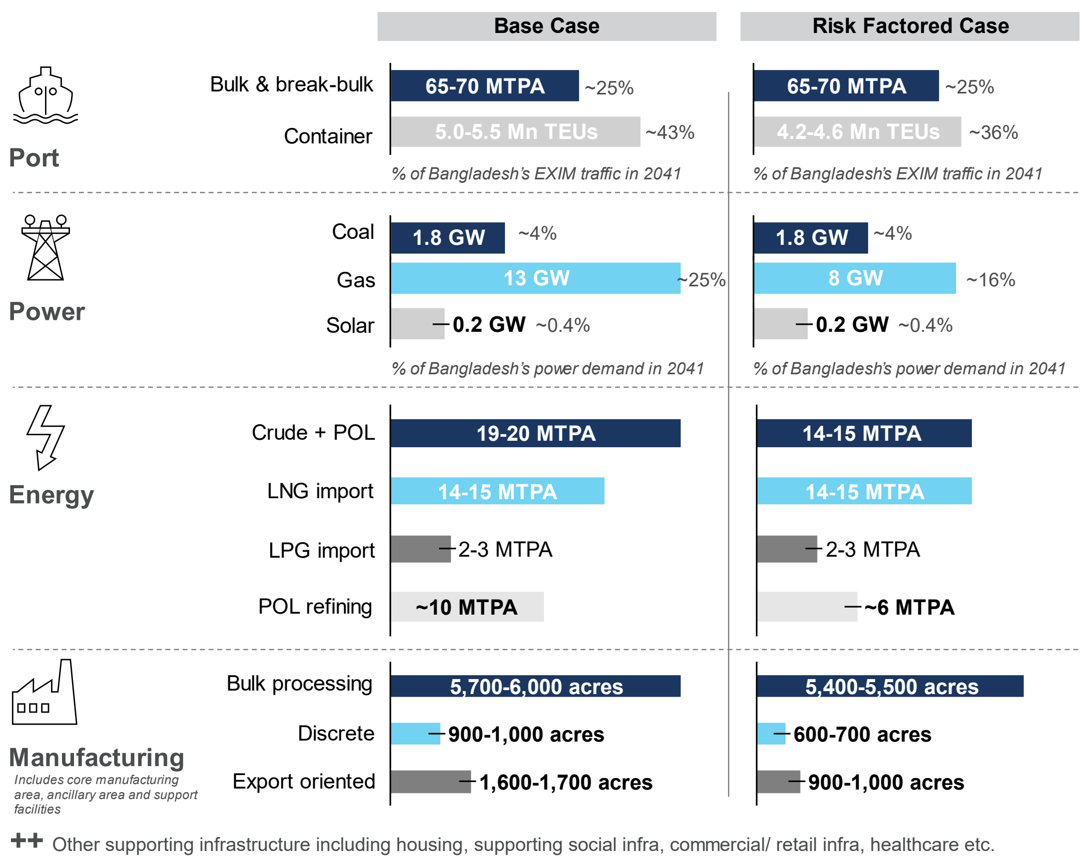
Key external risks

Large-scale projects like MIDI are prone to many external factors and risks, which may not be directly linked to it but might have a bearing on its future configuration:

- Success of export-manufacturing at MIDI will be contingent upon Bangladesh's competitiveness in the region, which will further depend upon several factors like trade policies, labour laws etc.
- Discrete manufacturing at MIDI, including automobile and electronics assembly are subject to competition within Bangladesh and to import of fully assembled products.
- In case of over-supply of container shipment capacity around Chittagong, achievement of projected 2041 traffic for MIDI may be uncertain.
- LNG prices are volatile and unpredictable. With increased import dependence, supply issues could impact energy-heavy industries as well as domestic power generation (as against import of power from power-surplus neighbours).
- If the energy security concerns in IEPMP are withheld and/or 765 kV transmission line project doesn't come up, the power generation capacity at MIDI may need to be curtailed.
- Sufficient surplus global refining capacities might reduce spread of POL products against crude. This may make POL product imports cheaper / competitive to domestic refining.

Considering these risks, 2 scenarios have been carved out for possible configuration.

Exhibit 8: Scenarios for MIDI's 2041 configuration



Challenges in MIDI's 2041 aspirations

MIDI is an ambitious project which could attract investments to the tune of USD 60-65 Bn over next 18-20 years. The road to attracting this investment is going to be challenging and will depend upon some key short to mid-term milestones:

- **Proof-of-concept by 2027**
  Much of investments envisaged at MIDI are contingent upon proof-of-concept of MIDI as a ready for investment proposition and which can infuse confidence in its strategic importance & commitment of GoBD as well as JICA. To meet the 2030 target, it is important for some critical projects are operational by 2027.

  These critical projects include port Phase 1 / Stage 1, coal power plant Phase 1, Port access road and land development for EZ 4 & 5.

- **Ensuring Hinterland connectivity**
  Capacity & quality of hinterland connectivity is key to MIDI's success: Chittagong-Cox's Bazar rail link[9], NH-1 upgradation to 4-lane[10], upgradation of power transmission network and Oil / LNG pipelines.

- **Investment promotion**
  MIDI will need targeted investment promotion policies and investor outreach in a phased manner to attract multi-sectoral investment.

- **Ecosystem creation**
  It is important to showcase MIDI as a large cohesive development, where the investors can get seamless access to its various components:
  - Industrial & warehousing spaces for manufacturing,
  - Port terminals for import & export
  - Access to utilities & raw materials like power, LNG feedstock etc.
  - Urban facilities like housing, retail & recreation to attract and retain skilled talent pool.
  - Digital infrastructure to enable competitiveness with regional competitors.

  Hence, planning, development & operations of MIDI's diverse components as an ecosystem**,** under a common vision & brand identify will be crucial.

- **Competitive operations and efficient service delivery**
  The yard stick of competitive port operations may be to compare Matarbari Port with some of the best of ports operations in the region. This may be defined in terms of cost-savings, time-savings, efficient service delivery and ease of doing business for shippers (/ freight forwarders, traders).

- **Land acquisition**
  Land for power & energy hub is mostly acquired but land acquisition for manufacturing hub and port is still underway. Given that previous acquisitions have been smooth, this is not envisaged as a major challenge. However, an effective rehabilitation & resettlement mechanism will be needed to minimize the negative impact on locals whose livelihood is dependent on salt refining and shrimp cultivation in the region.

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[9] Dual gauge rail link from Chittagong- Cox's Bazar is under-construction, funded by ADB. Fast completion of this project and future upgradation to dual track will be important for speedy freight transport. Further, access rail from Chakaria till Matarbari is pegged at USD ~1.3 Bn for ~26 km stretch. Given this high cost, it seems unlikely that the Port Access Rail Line rail line will come before 2027. In such case, alternate arrangements like intermodal hub at Chakaria, to connect to main Chittagong-Cox's Bazar rail line is necessary.

[10] JICA is undertaking improvement of some parts of NH1. There are also plans to upgrade NH1 to 4-lane in future. This may be an important project to ensure competitiveness of MIDI.

5 urgent actions could ensure that MIDI's transition to 2041 is orderly.

Over the next few years, build momentum and accelerate efforts to establish a proof-of-concept.
This will include:
- **MIDI projects -** Matarbari Port (Phase 1 / Stage 1), Port Access Road, Land development of EZ 4 & EZ 5.
- **Hinterland connectivity –** Chittagong-Cox's Bazar rail line, NH1 upgradation.
- **Anchor private investments** which are already committed.

In parallel, develop a physical master plan and pipeline of investable projects.
This will mean:
- **MIDI Master Plan, including revised land use plan, to be undertaken by GoBD with support from JICA** (with various layers – zonal & land use plan, infra plan, development control guidelines, social infra plan).
- Develop **transparent & uniform land allotment policy** for MIDI.
- **Prioritization of investable projects** basis feasibility (e.g. – Port Access Rail link, Power transmission line, LNG terminal etc.).
- Create a **dedicated investor facilitation cell** for MIDI.

Build accountability and Speed-up decision-making
Two priorities in the regard:
- **Fast-track formation of MIDI Authority** to lead development and administration of MIDI as a cohesive, sustainable future community.

  As seen in similar developments around the world, role of an anchor nodal agency is crucial. As MIDI now looks at an ambitious strategic vision for 2041, it is important to be spearheaded by an agency which can monitor and champion the holistic vision rather than looking at any particular component alone.

  Looking at global learnings, the nodal agency will need to play three crucial roles: 1) Plan, regulate and monitor the MIDI development & operations in line with larger vision, 2) Coordinate with different implementation agencies to ensure achievement of common goals, 3) Undertake investment promotion for MIDI as an integrated ecosystem.

  As we understand, MIDI Authority Act is in draft stages[11]. The same may be reviewed to capture strategic vision.

- **Till such time, evaluate a delivery unit within MIDI CC, to build leadership commitment for implementation of proof-of-concept projects.**

As MIDI takes shape, accelerate investment promotion at all fronts, starting with domestic anchor investors.
Crucial fronts will include:
- **Create investment promotion plan** – Prioritize domestic anchor investors across focus areas.
- Develop **sector-specific / tailored incentives** (tariff regime on imports, power & LNG, faster approvals etc.).

Few anchor investments by domestic conglomerates are already under discussion. Over the next 2-3 years, effort should be made to translate these commitments into on-ground investments to corroborate the importance of the project.

Engage shipping lines and terminal operators to establish direct connectivity to MIDI port.
These critical areas could be operations of projects like port terminals and energy import terminals. Further, early-on engagement with global shipping lines will be crucial to bring Matarbari on international shipping routes.

[11] The scope of this report doesn't entail review or comment on the draft Act.

Finally, what this means for Bangladesh in 2041

MIDI could support achievement of Bangladesh's 2041 vision by pushing growth in crucial areas.
…including increased manufacturing value-add within the country, export-growth & diversification, economic resilience, energy security, trade growth and logistics cost reduction.

MIDI could be a USD ~150 Bn economic hub – Adding ~6-6.3% to Bangladesh's GDP in 2041[12]
The economy of MIDI will be primarily driven by manufacturing activities, contributing ~70%.

MIDI could be an engine for economic expansion for Bangladesh, by being a gateway for investments, both FDI and domestic. It is expected that MIDI could attract investments worth **USD 60-65 Bn**, spread over next 20 years.

MIDI would contribute to Bangladesh's economic growth, while keeping fiscal balance, since a large part of the investment will be brought in through private sector. **Of these, FDI is expected to be USD ~5 Bn.**

MIDI would drive growth of exports for the country by significantly reducing lead-time of exports.
It is estimated that shipping time saving, logistics efficiency and availability of coastal manufacturing at Matarbari Port can save upto 25-30 days in export lead times (currently 110-120 days for RMG sector), improving Bangladesh's regional competitiveness.

MIDI could be an opportunity for Balance of Payments savings worth USD 16-18 Bn in 2041.
This would primarily come through value-add manufacturing at MIDI and through reduction in logistics costs.

The economic activities at MIDI could generate employment for at least 1.5 lakh jobs within its geographic expanse and being home to ~5-7 L people.

MIDI could be a strategic project for boosting India-Bangladesh relationships through building regional connectivity for the North Eastern Region, India.
It is estimated that transport of imported goods to Tripura can be ~70% cost-effective as against transport through the chicken-neck of Siliguri.

MIDI could be an example of economic development in Bangladesh away from Dhaka, which is one of the necessary enablers of driving growth and reducing poverty in the country.

The planned, greenfield development at MIDI would provide modern infrastructure, both physical and digital, along with competitive manufacturing and modern community facilities.

MIDI would also ultimately benefit the grassroot economy and citizens of Bangladesh.

- Over next 5 years – by creating high income jobs in Cox's Bazar region[13]
- Over next 20 years – By bringing level of income similar to Dhaka and raising standard of living of locals in Cox's Bazar region.

[12] In base case
[13] As per Data Collection Survey of Moheshkhali region, ~40% households in Moheshkhali had avg. monthly income <Taka 15,000. ~30% households were below poverty line.

To build an integrated economic hub for trade & investments in South Bangladesh, to support long-term vitality & growth of Bangladesh

MIDI's growth will rest of 3 key, inter-connected yet-strongly founded, economic pillars

Pillars

1. Deep-sea Port and Logistics Hub
2. Manufacturing Hub
3. Power and Energy Hub

USD ~4 bn
logistics cost savings for Bangladesh in 2041

25%
of Bangladesh's bulk and breakbulk traffic

36-43%
of Bangladesh's container traffic

20-30%
of Bangladesh total power demand

8-10MTPA
of refining capacity

8,500
acres of manufacturing area

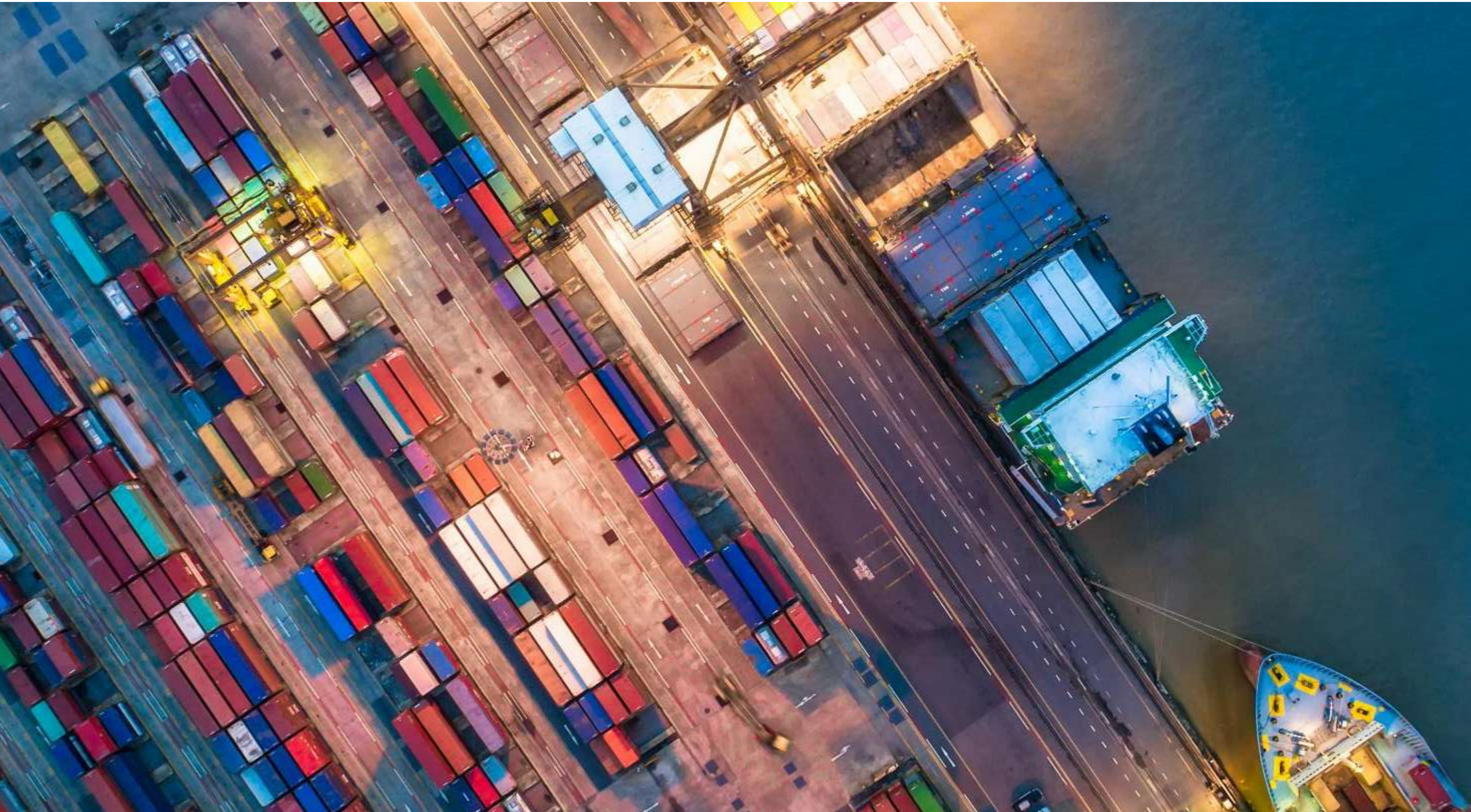
10%
contribution to BD's manufacturing output by 2041

>1.5 lakh
direct employment generation at MIDI

5-7 lakhs
residential community created at MIDI

Total GDP impact (2041) : USD ~150 bn (6-6.2% of Bangladesh's GDP)

Introduction, Context & Approach



2. Introduction

Moheskhali - Matarbari Integrated Infrastructure Development Initiative (MIDI) is an ambitious and futuristic infrastructure project for Bangladesh.

The project was envisioned in 2014 as a part of the visionary Bay of Bengal Industrial Growth Belt (BIG-B) program – a joint effort of the Government of Bangladesh (GoBD) and the Government of Japan to build industrial agglomeration-led growth in the south Chittagong region of the country. Over the last 8 years, Japan International Cooperation Agency (JICA) has supported the Government of Bangladesh in planning and development of MIDI. So far, MIDI has made progress in getting major infrastructure projects off the ground.

Propelled by certain shifts and developments in global, national and regional landscape over last 3-4 years, JICA felt the need for developing a holistic strategic vision for MIDI project and to reassess its economic impact potential and commissioned a survey to study and propose MIDI's strategic vision 2041.

This document captures findings of this survey and recommends the strategic vision for MIDI in 2041. It also aims to set aspirations for MIDI's future and its potential impact on Bangladesh and neighbouring region.

The vision set forth in this document has been formulated based on extensive stakeholder interactions and analysis of existing facts & futuristic market trends. The document also lays down a strategic roadmap to translate the vision into reality, including key challenges which need to be accomplished.

The report is structured as below:

- Chapter 1: Executive Summary
- Chapter 2: Introduction (this chapter)
- Chapter 3: Context-setting
- Chapter 4: Vision 2041
- Chapter 5: Pillar 1: Deep-sea Port & Logistics
- Chapter 6: Pillar 2: Manufacturing Hub
- Chapter 7: Pillar 3: Power Generation and Energy Hub
- Chapter 8: MIDI's Configuration
- Chapter 9: Impact Assessment
- Chapter 10: Roadmap to 2041
- Chapter 11: Annexures

3. Context-setting

3.1. MIDI – Key Features and Current Status

3.1.1. Background & Journey so far

Japan's Free and Open Indo-Pacific strategic vision (FOIP) aims to bring together the countries around the Indian and Pacific oceans in order to develop a free and open maritime order in the region as "international public goods". Hence, improving connectivity between Asia, Middle East and Africa through the Indo-Pacific in a bedrock of FOIP vision.

Furthering the cause of FOIP, in 2014, the Government of Bangladesh and the Government of Japan agreed on the economic cooperation initiative, "Bay of Bengal Industrial Growth Belt (Big-B)" to accelerate industrial agglomeration along the Dhaka-Chittagong-Cox's Bazar belt area.

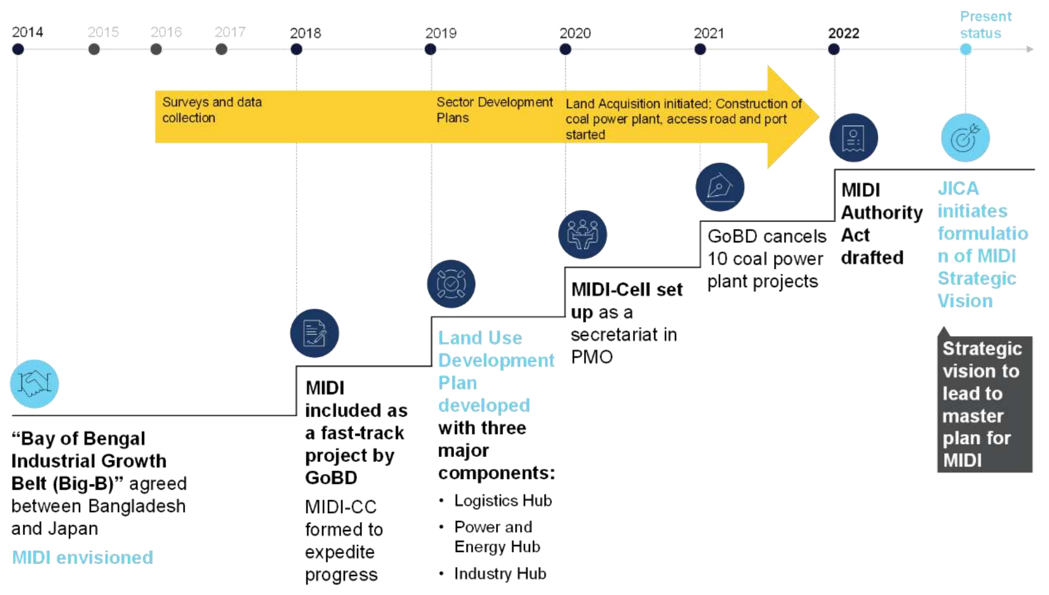
Moheshkhali-Matarbari Integrated Infrastructure Development Initiative (MIDI) is an important part of BIG-B, and is aimed at comprehensive development in Moheshkhali-Matarbari region.

Given its pivotal importance, in 2019, MIDI was included in Fast Track Projects of the Government of Bangladesh. In this regard, MIDI Coordination Committee (MIDI CC) was also formed for coordination amongst ministries/agencies and monitoring of the project. Further, the initiative is being driven by MIDI Cell, which was formulated in 2020 and is working directly under the Prime Minister's Office (PMO).

Since the very inception, JICA has been an integral part of MIDI's development.

The following exhibit captures the journey of MIDI to date in brief. A detailed chronology of studies and surveys undertaken for the project is given in Annexure.

Exhibit 9: MIDI - Journey so far



With JICA's support, various preparatory activities have been undertaken for the MIDI region, including a "Land Use and Development Planning Survey in Moheshkhali and Matarbari Area" (2019). Further, various sector development plans have also been prepared by different Ministries of the GoBD with JICA support.

In the recent past, several shifts have taken place globally and in Bangladesh across macro-economic landscape, including demand disruption due to COVID 19, supply disruption due to Russia-Ukraine conflict, push for decarbonization and climate impact mitigation, etc. Against such trends, JICA aims to align with various GoBD stakeholders and develop a comprehensive MIDI vision and developmental direction.

3.1.2. Existing development plan and status

MIDI has been planned across ~33,000 acres (including ~12,600 acres of eco-tourism zone EZ 1) in Moheshkhali upzila (under Cox's Bazar district) across 2 unions – Matarbari union and Dhalghata union.

MIDI's existing Land Use Plan (basis LUDP Survey prepared by JICA, 2019) has been categorized into three broad components:
- Logistics Hub
- Power and Energy Hub
- Waterfront Industries Hub

35+ projects were planned across these components in short-term, medium-term, and long-term as a part of the LUDP-2019 for MIDI.

A detailed list of all the projects, forming part of MIDI and proposed / developed so far, is attached in Annexure.

The development concept for each of the component is shown in the exhibit below.

Exhibit 10: Components of MIDI's Land Use Plan as per LUDP, 2019

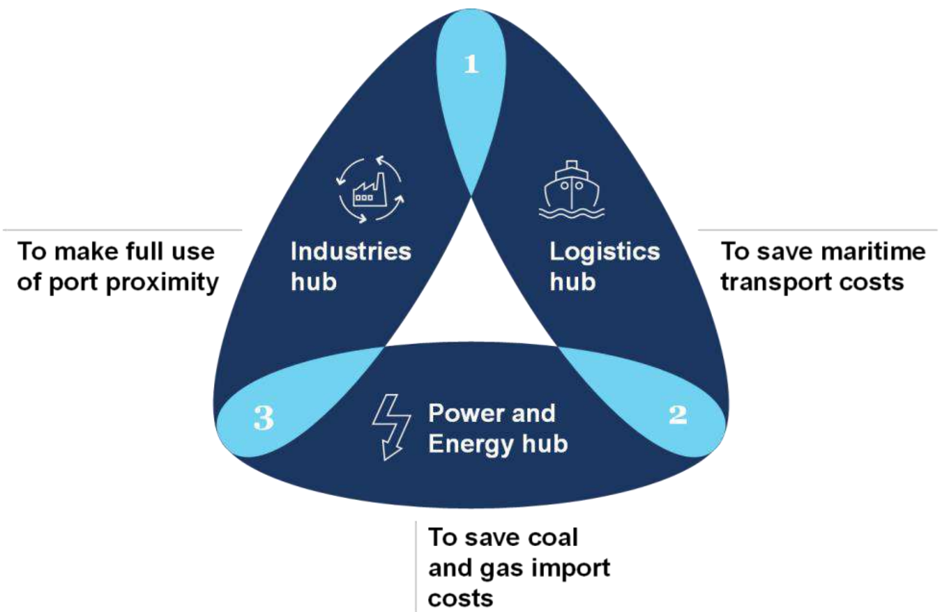
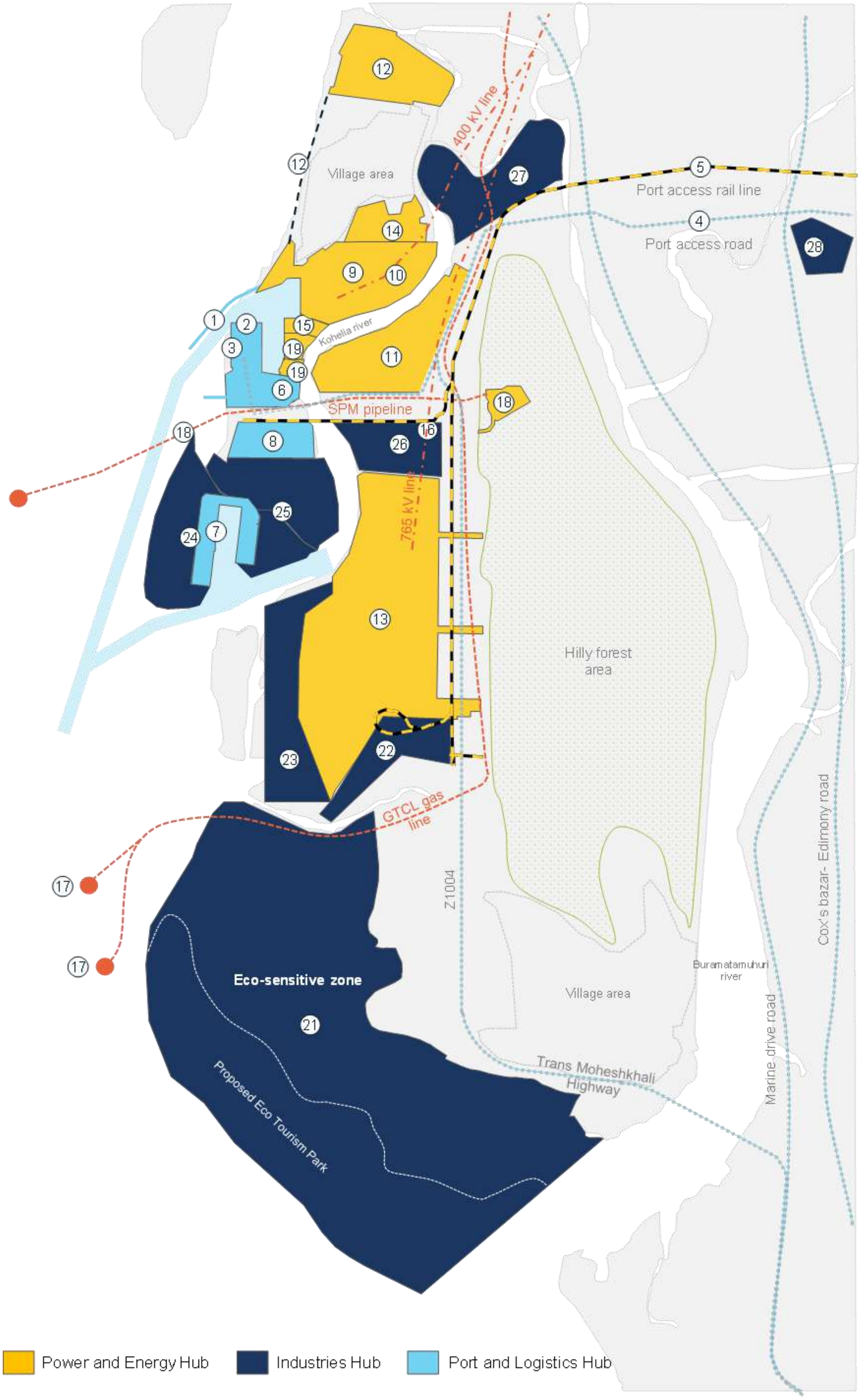


Exhibit 11: MIDI – Long Term Development / Land Use Plan (Updated till date)



Logistics Hub: ~1,670 acres

#	Project	Details	Status
	Matarbari Port Phase 1 / Stage 1	240 acres	
1	Breakwater	North (2,150 m), South (670 m)	Completed
2	Container Berth	1 berth; 0.7 Mn TEUs	Construction not started yet. Expected completion by 2027
3	Multi-purpose Berth	General cargo - 1.5 Mn tons Bulk cargo - 0.6 Mn tons	Construction not started yet. Expected completion by 2027
4	Matarbari Port Access Road	~27 km Road and 17 Bridges; 2-lanes Port Connector Road 2.2 km	Construction not started yet. Expected completion by 2027
5	Matarbari Port Access Railway	From Matarbari to Dohazari - Cox's Bazar	Land acquired, DPP prepared
6	Matarbari Port Phase 2 / Stage 1	3 Container berths of 2.1-3.5 Mn TEUs, 3 Coal berths of 9-10.3 Mn TEUs, 1 LNG berth of 3.8 Mn Tons and 3 feeder berths (390 acres)	Land to be acquired
7	Matarbari Port Stage 2	3 Container berths of 2.1-3.5 Mn TEUs, 4 bulk berths and 3 feeder berth (540 acres)	Land to be acquired
8	Logistics Zone	Inland Container Depot (ICD) and other logistics center (500 acres)	Land to be acquired

Power and Energy Hub: ~10,300 acres

#	Project	Details	Status
9	USC Coal Power Plant #1, #2 (Phase 1) - CPGCBL	Total land - 1,620 acres Each phase – 1,200 MW Only Phase 1 plans alive. Phase 2 – Planned[14]; Phase 3-4 - Cancelled	Land acquired; Expected completion of Phase 1 - 2024
10	USC Coal Power Plant #3, #4 (Phase 2) - CPGCBL		
11	USC Coal Plant #5, #6	1,320 acres; Coal plants cancelled.	Land acquired; No proposals.
12	Orion Power Plant + Coal conveyor belt	Total 1,100 acres (erstwhile Kohelia Plant) Orion - 635 MW | 600 acres	Land acquired; Land allotted to Orion – FS ongoing
13	BPDB Power Hub	5,680 acres	~5,580 acres acquired; No proposals as of now.
14	CPGCBL Solar Power	460 acres	Land to be acquired
15	Coal Terminal (CTT)	Terminal and Belt Conveyer | 110 acres	Need assessment required
16	Power Transmission Lines	400 kV Line and 765 kV Line	400 kV line completed
17	Moheshkhali FSRU	2 FSRUs: 500 mmcfd each	Operational
18	SPM with double pipeline	Unloading Capacity: 9 MTPA 3 Crude Oil Tank and 3 HSD Tank (190 acres)	>90% complete
19	LNG terminal	3.8 Mn Tons | 114 acres	Land acquired - EOI received
20	LPG terminal	1 ton	Planned

Water Industries Hub: ~21,000 acres

#	Project	Details	Status
20	IEZ 1	12,612 acres (Eco-sensitive zone)	Land acquisition completed
21	IEZ 2	1,400 acres	Land to be acquired
22	IEZ 3	1,557 acres	Land to be acquired
23	IEZ 4	1,722 acres	Land acquisition completed
24	IEZ 5	1,240 acres	Land acquisition completed. ~540 acres allotted to private players
25	IEZ 6	1,540 acres	Land to be acquired
26	IEZ 7	758 acres	Land to be acquired
27	IEZ 8	112 acres	Land to be acquired

Logistics hub

The logistics hub at MIDI was planned across **~1,670 acres** with projects categorized under deep-sea port, connectivity enhancement and logistics development; aggregating to a container handling capacity of ~4.9 Mn TEUs and bulk cargo capacity of 16-38 Mn Ton.

The implementation agency for logistics hub is Chittagong Port Authority (CPA), under the Ministry of Shipping. The Port is being developed under JICA funding.

The Logistics Hub was proposed to be developed in 2 stages:

- Phase 1 / Stage 1 – Currently ongoing
  - 1 container berth – Exp. 2027; Construction not started yet.
  - 1 multi-purpose berth – Exp. 2027; Construction not started yet.
  - Breakwater – Completed
  - Port access road (27 km from Chakaria) – Exp. 2027
  - Port railway line (38 km from Chakaria) – Land acquired; DPP[15] not yet approved.

- Stage 1, Phase 2 – Proposed
  - 3 container berths
  - 3 coal berths
  - 1 LNG berth
  - 3 feeder berths

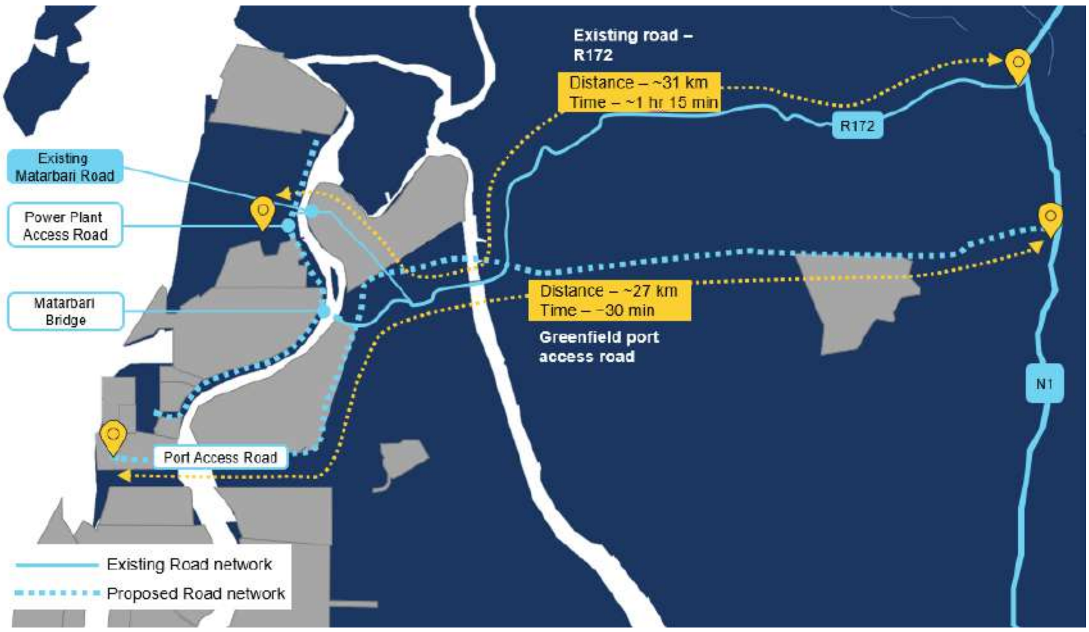
- Stage 2 – Proposed
  - 3 container berths
  - 4 multi-purpose and bulk berths
  - 3 feeder berths

Out of total 1,670 acres, 240 acres has been acquired for Phase 1 / Stage 1.

Perspective on need for Access Road
Existing 2-lane R172 link to N1 passes through villages. This may be sufficient to service power plants, but will not suffice the needs of port and manufacturing hub, once operational. Hence, greenfield port access road will be a necessary precursor for port and industry operations at MIDI.

Perspective on port railway line
As understood from various stakeholder interactions, port railway line may not be viable in short-term due to high construction cost (USD 1+ Bn). In long-term, rail connectivity till port will be key for port and industrial hub. Till such solution is found, an inter-modal hub at Chakaria (on the trunk Chittagong-Cox's Bazar rail line) may be explored.

Exhibit 12: Existing and proposed road connectivity to MIDI region



[15] Development Project Proposal

Power and Energy hub

MIDI's concept started as a Power hub. The port was originally targeted for the sole purpose of serving coal-fired power plants only. Hence, power and energy hub remain as central to MIDI's concept.

The power and energy hub at MIDI is planned across **~10,300 acres** with 10 projects of power and 11 projects of energy including coal power, LNG power, solar power, LPG, oil and gas energy. The sponsoring ministry for this hub is Ministry of Power, Energy and Mineral Resources Development. Various agencies under the ministry are responsible for implementation of different projects.

Key projects in power generation & their status:

- Matarbari Ultra Super Critical Coal fired power plant (Phase 1; 1.2 GW)[16] – Under construction; Exp. Jan-July 2024[17] and being funded by JICA
    - 14.3 km channel dredging (18.5 m average draft, 250 m wide) – Completed
    - 300 m coal jetty[18] – Completed
    - 80 m oil berth – Completed
    - Coal yard – ~80% complete
    - 4 temporary jetties – Completed
    - Chimney and turbines - Completed
    - Ash pond – Under construction
    - Power plant connectivity bridge & road – Under construction

- Matarbari Ultra Super Critical Coal fired power plant (Phase 2; 1.2 GW)[19] – Only common utilities and transmission infra under construction as part of Phase 1. JICA has withdrawn funding for this phase (after GoBD's cancellation of coal plants). For the purpose of this report, this phase is considered as uncertain.

- Orion Group's 635 MW coal fired power plant – ~600 acre land allotted in erstwhile Kohelia Power Plan site; feasibility study ongoing (Exp. 2030)
- Matarbari-Madunaghat 400 kV double circuit transmission line[20] – Completed

- Matarbari Ultra Super Critical Coal fired power plants (Phase 3, Phase 4, Phase 5, Phase 6 of CPGCBL; 2.4 GW) + BPDB Power Hub Coal Plants – Cancelled

- Solar power plant (460 acres) – Proposed

- LNG power plant (500-600 MW) - Proposed

~9,270 acres has already been acquired by Bangladesh Power Development Board (BPDB) and Coal Power Generation Company Bangladesh Limited (CPGCBL).

Key projects in energy imports & their status:

- 2 FSRUs for LNG (500 mmcfd each) – Operational (operated by Summit and Excel Energy)

- Single-point Mooring (SPM; 4.5 MTPA) and pipeline till ERL Refinery for crude oil import – >90% complete

- Single-point Mooring (SPM; 4.5 MTPA) and pipeline for HSD import – >90% complete

- LNG terminal – Land acquired, EOIs have been received

- Coal trans-shipment terminal (CTT) – Planned across ~110 acres to cater to coal demand for ~20 GW coal power plants at MIDI and power plants in Payra, Rampal and Banshkhali. With most of these plants cancelled, CTT may not be necessary.

[16] Implementation agency: CPGCBL
[17] Once completed, the channel, jetties and berths will be handed over by CPGCBL to CPA for operations. Terms of such transfer are currently under discussion.
[18] Soon to be handed over to CPA for operations
[19] Implementation agency: CPGCBL
[20] Implementation agency: Power Grid Company of Bangladesh (PGCB)

(Waterfront) Industries hub

The industries hub is being implemented by Bangladesh Economic Zone Authority (BEZA) and is planned across ~21,000 acres with 8 EZs.

Out of this, ~8,400 acres were planned across 7 EZs.

- Various industrial sectors[21] were suggested for the 7 EZs, but no detailed study has been undertaken.

- Land for 2 EZs in Dhalghata (EZ 4 and 5; total ~2,960 acres) has been acquired by BEZA.

- ~770 acres in EZ 5 has been allotted to various private players:
  - ~450 acres – TK Group subsidiaries (SPL Petrochemicals and Samuda Chemical) for development of:
    - ~6 MTPA oil refinery – Exp. completion by 2027
    - LPG terminal – Exp. completion by 2030
    - Naphtha cracker and downstream petrochemicals complex – Exp. by 2030
  - ~230 acres - Pacific Gas and Genesis Textiles for grain silos

Basis discussion with S. Alam group, it is also in discussion with BEZA for allotment of ~200 acres land in EZ 4/5, for refinery development.

Residual ~12,600 acres, located in Moheshkhali next to Sonadia Eco-tourism park, was demarcated as eco-sensitive zone (refer Annexure). A feasibility study for this zone is already conducted by BEZA, which has suggested development of an eco-sensitive tourism project.

[21] Various sectors were suggested for these EZs including chemical, petrochemical & plastic, cement, fertilizer, steel manufacturing/ non-iron metal industries, deep sea fishing, waterfront mariner, shipbreaking/ recycling, shipbuilding, leather goods & footwear, light engineering, 2-wheeler manufacturing, automobile, consumer electronics, agro-based industries, pharma-chemicals, ceramics, ICT & software, furniture, textile & RMG and logistics.

3.1.3. Other major infrastructure projects

Various supporting infrastructure projects were proposed in these SDPs.

- **Water supply to Matarbari/ Moheshkhali region**[22] **–**
  - Short-term plan – Matamuhuri River water to be tapped at intake point along Chittagong-Cox's Bazar highway and stored in regulation pond.
  - Long-term plan – A dam to be constructed on Matamuhuri Main River.

  Estimated CAPEX as of Aug 2022 is USD ~0.8 Bn[23] (including short-term and long-term facilities).

- **New roads / upgradation of existing alignments proposed by the Roads and Highways Department:**
  - National Highway 1 (NH1) – Currently 2-lane; Brownfield improvement in certain sections ongoing; JICA funded.
  - Greenfield Edimony to Cox's Bazar Road (36.9 km) – Proposed, DPP prepared
  - Marine Drive from Mirsharai to Cox's Bazar through Moheshkhali-Matarbari – Proposed
  - Trans-Moheshkhali bridge connecting Moheshkhali to Cox's Bazar (>1 km) – Proposed
  - Gorakghata-Sonadia Island (Z-1004) Road – Brownfield road widening

- **Rail link development project** connecting Dhaka-Chittagong-Cox's Bazar (DCCRPPF[24]) – Ongoing project (land acquired and embankment built); funded by ADB.

A map of the hinterland connectivity is shown overleaf.

3.1.4. Project governance

MIDI's governance is currently handled by agencies at 3 levels:

- **MIDI Coordination Committee (MIDI CC),** instituted in 2018, under the chairmanship of Principal Coordinator (SDG Affairs), PMO with members from various stakeholder ministries. The committee is the key co-ordination authority for MIDI.

  Stakeholder ministries to MIDI CC are: Prime Minister's Office, Bangladesh Economic Zone Authority, Power Division, Energy & Mineral Resource Division, Ministry of Water Resources, Road Transportation & Highway Division, Ministry of Shipping, Ministry of Industry, Ministry of Commerce, Ministry of Land, Local Government Division, Chittagong Division and Cox's Bazar District.

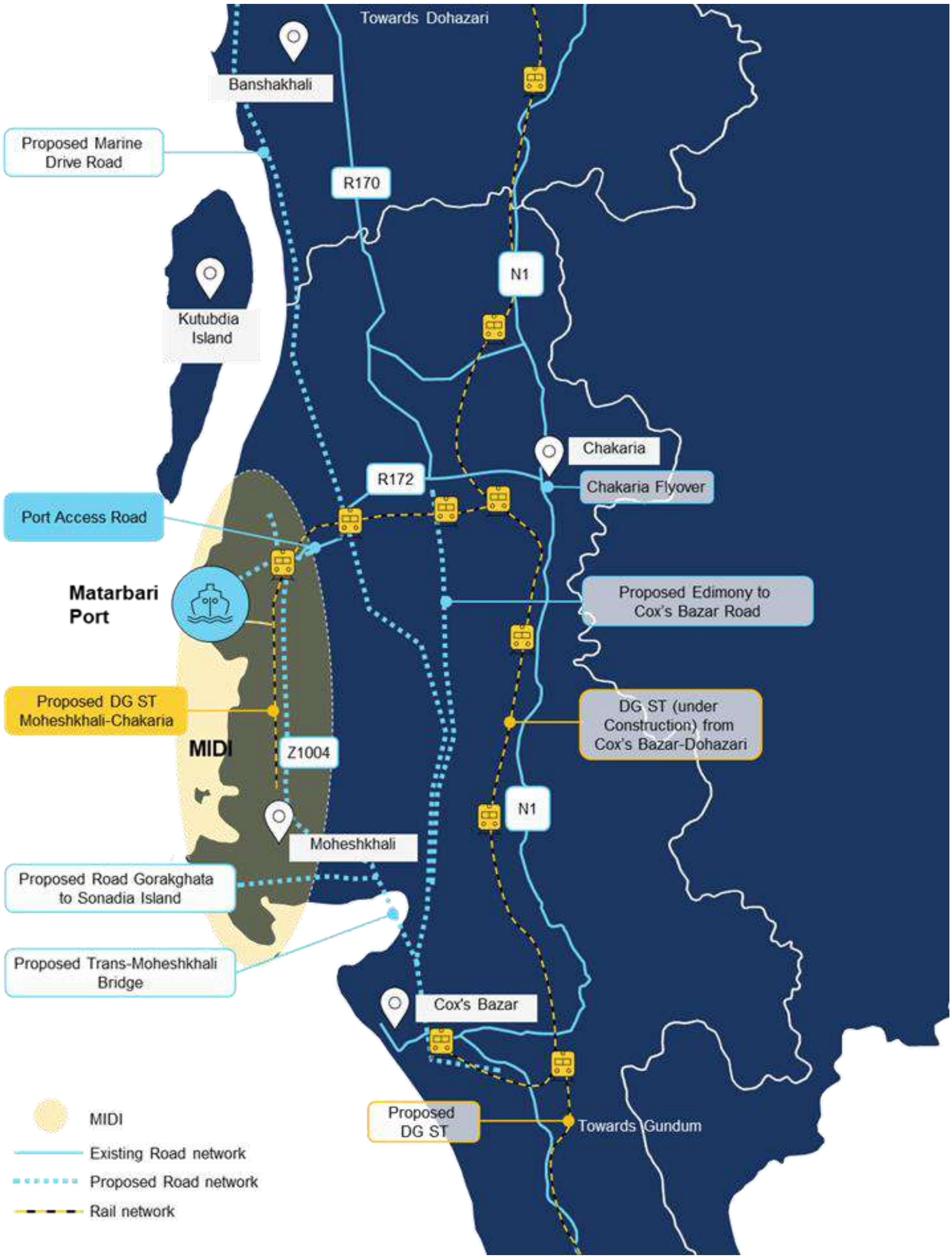
- **MIDI-Cell,** formed in 2020, under PMO to streamline and coordinate between various line Ministries. MIDI-Cell is headed by Director General of Sub-regional Co-operation Cell, PMO; has 2 Directors and 1 Policy Advisor dispatched by JICA.

- **Individual line Ministries and their implementation agencies,** responsible for ownership, funding and implementation of various projects.

Further, the Government of Bangladesh is now in process of formulating an empowered **MIDI Authority** *(nomenclature yet to be finalized)*, which will be the nodal implementing and coordinating agency for MIDI region. Draft Act for formulating the Authority has been prepared and is likely to be passed by Parliament in 2023.

[22] Data Collection Survey on Water Resources Development in Southern Chattogram, Aug'22
[23] For the entire Chakaria + Matarbari region
[24] Dhaka-Chittagong-Cox's Bazar Rail Project Preparatory Facility

Exhibit 13: MIDI - Hinterland Connectivity Projects (Rail & Road)



3.2. Need for vision development

MIDI's development is taking place in the context of a global economy that is undergoing profound change, creating opportunities but also facing serious downside risks from economic, political and social conflicts and climate change. A fast-paced technological revolution, the digital age, is ongoing that will eventually change the way we live, work, and interact with the global community. Closer home, Bangladesh has seen developments in its policy and infrastructure landscape over the last few years, which doesn't leave MIDI untouched.

These shifts and developments have created a need for re-visioning MIDI's role in the economic development of Bangladesh.

3.2.1. Recent global shifts

Climate change and decarbonization targets

The global energy mix is shifting rapidly towards non-fossil power. Economies are realigning their development goals towards fighting climate change and promoting decarbonization. Multiple forums like COP26 have also reinforced these targets. Bangladesh is amongst highly vulnerable countries in terms of climate change. In line with the rapid energy transition, Bangladesh also introduced its own clean energy targets and cancelled multiple coal power projects across the country.

Some of these plants were also proposed to be developed in the MIDI region. Hence, a need to realign MIDI's vision to current climate goals is imperative.

Shifting Investment trends

Various macro-economic factors and regional manufacturing and supply chain diversifications have created global investment shifts.

Multiple businesses and companies are looking to diversify supply chains away from China leading to China+1 diversification. This has created opportunities for other Asian countries to tap into global trade through manufacturing-led export capabilities. Economies like Thailand, Malaysia and Vietnam have already taken a lead in developing export-led ecosystems.

Further, with recent geo-political and economic developments in Myanmar and Sri Lanka, there is a growing need to create resilient economies which can attract long-term investments.
Bangladesh can tap on to this opportunity to become a favourable destination for investments. Moreover, regional initiatives like BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) can be favourable enablers to promote trade cooperation, investments and support export focused manufacturing.

MIDI can be a key instrument in tapping this regional growth opportunity, by leveraging its port and logistics competitiveness.

Supply chain disruptions in global trade

Geo-political events like Russia-Ukraine conflict and Covid-19 pandemic have highlighted vulnerabilities in global supply chains, and disrupted trade flows. Many countries are now focussing on import substitution and undertaking initiatives to guide against global commodity price fluctuations.

This can be translated to three major shifts for Bangladesh:

- **Reduction of import dependency:** By building resilience of domestic manufacturing and greater self-reliance for key commodities.
- **Guarding against global price fluctuations:** Reinforced concerns on energy security, given supply disruptions and highly volatile global oil and LNG prices.

- **Reinforced need for regional cooperation and trade:** Regional trade can prevent against large global supply chain disruptions.

MIDI can play a pivotal role by promoting import substitution and export diversification industries. It can also resolve supply chain issues by eliminating the need for trans-shipment at regional ports.

3.2.2. National shifts and developments

Certain country level policy changes and developments also have impact on MIDI.

Cancellation of coal power plants to move towards cleaner fuels

In 2021, Government of Bangladesh, declared moratorium on 10 of the 18 proposed power plants. This was considered a huge step towards transition towards cleaner fuel. Owing to this, ~2.4 GW of coal-based power plants (Phase 1 and Phase 2 plants of 1.2 GW each) in Matarbari (out of proposed ~15 GW) are still approved.

Bangladesh's vision 2041

Bangladesh's Perspective Plan 2021-2041 (PP 2041) document defines Vision 2041, which seeks to eliminate extreme poverty and reach Upper Middle-Income Country (UMIC) status by 2031, and High-Income Country (HIC) status by 2041 with poverty approaching extinction.

The document lays emphasis on Industry 4.0 and export led growth with infrastructure, energy efficiency & public-private endeavour as key enablers. The plan lists proposed targets and potential growth that can be achieved by 2041.

- Average growth rate of ~9% till 2041
- Industry to continue to account for 35% of the country's GDP by 2041.
- Average export growth of ~11.12% over 20 years
- Export diversification beyond RMG
- ~13x growth in EXIM container traffic[25]
- ~7x growth in sea freight traffic[26]
- Adopting least-cost power generation path

MIDI's vision will need to tailor itself to country's vision.

Industrial Policy

Government of Bangladesh's industrial policy focuses on export diversification. Textiles currently account for majority of the exports (~82-85%) of Bangladesh.

The new industrial policy promotes exports beyond RMG and textiles, to other labour-intensive industries. In line with this, MIDI's potential to support growth of exports will need to be evaluated.

Development of Integrated Energy and Power Master Plan

JICA is currently supporting Govt. of Bangladesh develop an Integrated Energy and Power Master Plan for the country, which will pave way for country's transition towards cleaner energy and power sources.

The draft master plan is currently under review and finalization. As per draft document, Bangladesh's future energy focus will be on gas, renewable energy (wind and solar), hydrogen, ammonia etc. Moreover, the document also projects a corrected & realistic GDP growth target for Bangladesh.

MIDI's vision would need to realign with this Integrated Energy and Power Master Plan.

Economic infrastructure projects

Government of Bangladesh has announced several ambitious infrastructure projects which might have implications on MIDI:

- Bangabandhu Sheikh Mujib Nagar / Mirsarai Economic Zone, being

[25] Measured as container traffic (in Mn TEUs) and bulk traffic (in Mn tons) between 2021 and 2041

[26] Measured as Billion tonnes Kilometers between 2021 and 2041

developed by BEZA as the largest economic zone in the country.
- Bay terminal, proposed as a large container terminal in Chittagong with draft of 12 m.

Implications of these projects is discussed in relevant sections of the report.

3.2.3. Regional developments

India-Bangladesh discussions on Northeast cooperation

Recognizing the role of Bangladesh in development of northeast region of India, India and Bangladesh have been in discussions for cooperation in use of Chittagong and Mongla port. Role of Matarbari port needs to be evaluated in augmenting connectivity and access for the north east Indian states.

New trans-shipment ports in South Asia

Various new port projects have been declared / under various stages of development in South Asia, major being Hambantota Port (Sri Lanka), Andaman Port (India), Vizhinjam Port (India), Krishnapatnam Port (India). Matarbari Port's role in regional trade needs to be evaluated considering these regional developments.

3.3. Approach to vision development

The following describes the approach taken to develop MIDI's vision.

A. Cross-cutting dimensions studied in line with global, national, regional shifts and developments
MIDI's vision factors cross-cutting dimensions which emerge out of the shifts and development discussed above:
- Manufacturing value addition and reduction in import dependencies
- Export growth and export diversification
- Logistics cost optimization
- Energy security
- Cleaner energy

Multiple analysis and scenarios were considered across these cross-cutting dimensions like:
- **20+ Industrial sectors studied** Petrochemicals, Fertilizers, Steel, Chemical and chemical products, Cement, Plastics, Rubber, Agri and food processing, Equipment and Electronics, Auto and auto components, Textiles (pre RMG), Pharma drug formulation, Readymade garments (RMG), Leather and leather goods, Paper and paper products, Glass, Furniture

- **8+ power and energy options considered**
  - **Electricity/ Power sources-** Coal, Natural Gas, HFO, Renewable energy;
  - **Energy sources-** LNG, POL & products (Gasoline, diesel etc.), LPG, Electricity

- **Multiple trade commodities & trading partners studied**
  - **Bulk commodities -** Cement clinker, stone, coal, scrap, food grains
  - **Break-bulk commodities-** Sugar, fertilizer;
  - **Containerized goods -** Electronics, textiles, garments, steel, plastics, automobiles etc;
  - **Liquid commodities-** LNG, petroleum and petroleum products, edible oil;
  - **Trading partners -** China, Singapore, India, UAE, Indonesia, USA, Thailand

B. Factoring stakeholder inputs
We have sought to maximize inputs from government stakeholders who are key to development of MIDI.

These stakeholders include various line ministries, implementation agencies & bodies and nodal authorities. A list of the stakeholder interactions is given in Annexure.

C. Triangulation of hypothesis with private sector / potential investors and industry reports
Directions developed on each sector across manufacturing, logistics and power were validated through interactions with 20+ private sector companies in Bangladesh.
- Existing manufacturing players in steel, cement, plastics, paint, fertilizer, edible oil, electronics, automobiles etc.
- Traders and freight forwarders in Dhaka and Chittagong
- Existing Japanese investors in Bangladesh
- Existing Indian investors in Bangladesh

Further, various industry reports and publications in Bangladesh were studied to validate understanding of the sector.

D. Factoring inputs from global thought leaders and industry experts
We engaged 20+ global leaders and industry experts across different industries and sectors to understand global trends and market insights. Various insights, analysis, considerations, and dimensions used

in this report are based on inputs from these global thought leaders.

Brief profile of the experts is given in the Annexure.

E. Use of Proprietary tools and models on global and India energy outlook
Multiple tools like the input-output matrix, clean sheet costing models for various sectors, proprietary cost curves were used to undertake analysis for this report. Additionally, insights and learnings from various internal global teams were used to develop trends and sector perspectives.

F. Go & See approach to MIDI's existing projects
Site visit to MIDI was conducted to understand existing ground status and size & scale of various projects.

G. Assessing MIDI's competitiveness across components
MIDI's competitiveness varies across different sectors and was determined on case-to-case basis.

For example, competitiveness in logistics depends on size of vessels which can be accommodated, turnaround time, efficiency of handling operations, and capacity. Matarbari Port was hence compared to Chittagong Port, Payra Port.

Similarly, competitiveness in manufacturing depends upon port-proximity, land availability, power availability, policy support; and was compared to areas like Dhaka, Chittagong, Mirsarai Economic Zone.

H. No change in configuration of under construction projects and consistency with land use earmarked in Land Use Plan
The overall geographical expanse as per LUDP 2019 and Sector Development Plans is considered to be the theoretical cap on total area to be utilized.

I. Taking learning from global and Indian industry peers
We drew parallels across the study from learnings and takeaways from the global benchmarks.

Multiple hypotheses were tested against these takeaways. Further, interactions with leaders from industry have been used to derive learnings from these benchmarks. Some of the benchmarked studies include: Mundra Port & SEZ, India; Tanger Med, Morocco; Map Ta Phut, Thailand; Bintulu, Malaysia.

3.4. Perspective on MIDI's competitiveness

While a deeper view on MIDI's competitiveness across distinct sectors will be taken in subsequent chapters, this section presents our perspective on competitiveness of MIDI from a macro perspective.

3.4.1. Bangladesh's competitiveness

The scope of this report does not include thorough evaluation of Bangladesh's competitiveness basis its macro-economic standing, but a few themes, already discussed in Perspective Plan 2021-41, are important for a study on MIDI.

- **With GDP of ~USD 460 Bn and growth rate of 7-8% (CAGR over last 6 years), the country has performed incredibly well in establishing itself among the fastest growing economies of the world**[27]**.**
- In fact, with per capita GDP of ~USD 2,450, it is ahead of other countries in the sub-continent including India and Pakistan[28].
- Further, there is high optimism on Bangladesh's future growth potential. GDP growth rate projection ranges include ~9% CAGR over 2021-41 as per country's Perspective Plan 2041, and IMF's long term growth rate projection of 6.8% CAGR.
- Bangladesh is currently an LDC (Least Developed Country) but is fast progressing to move out of this bucket to a middle-income economy by 2026.
- Geographically, the country has an advantage of being in proximity to a large global supply chain ecosystem, both in South Asia, Northeast Asia and ASEAN.
- Country's political economy has been stable and steady on economic reforms/
- Regional trade & cooperation has been robust, with Bangladesh having friendly relations with its key EXIM partners.
- Bangladesh has also reaped benefits on account of its low labour costs and performed overwhelmingly well in being amongst world's largest exporters in textiles & garments industry

But, as the Perspective Plan 2021-41 document outlines, there is a long way to go for Bangladesh's economy to prepare for future and achieve its vision 2041.

- **Bangladesh's competitiveness in exports**
  Existing competitiveness in ready-made garments sector is largely built on low labour cost and LDC benefits of trade-duty waivers.

  Also, the strength area in RMG sector lies in low value-add parts of value chain like sewing, weaving, etc. Once Bangladesh moves out of LDC status, it will need to compete with other countries which already are far ahead on other competitive factors.

- **Low competitiveness in regional trade**
  As per World Bank's Logistics Performance Index 2018 rankings, the country ranked 100th out of a total of 160 countries – compared to 26th rank for China, 32nd rank for Thailand, 39th rank for Vietnam and 44th rank for India[29]. Laggard logistics adds to overall business costs by increasing freight charges and lead time across sectors and commodities.

  Further, Bangladesh ranked 168th of the total 190 countries in World Bank's ease of doing business ranking – much behind its regional peers like India (63), Thailand (21), Vietnam (70), etc.

  Bangladesh's performance on internationally recognized indices needs to significantly improve in order for it to attract investments, achieve

[27] As per Bangladesh Bureau of Statistics
[28] As per World Bank estimates
[29] https://lpi.worldbank.org/international/global

high growth and meet its PP2041 commitments.

- **High import dependence for finished goods**
  Further, across industries and sectors Bangladesh is dependent on import of finished products. This is primarily a result of lacklustre domestic manufacturing infrastructure in the country. Key import dependent sectors include:
  - Equipment and machinery
  - POL
  - Chemicals
  - Fertilizers
  - Polymers, etc.

  Hence to achieve its PP-2041 ambition, Bangladesh needs to focus on incremental value-added manufacturing within its borders, to boost growth and enhance manufacturing ecosystem in the country.

3.4.2. MIDI's competitiveness

Matarbari-Moheshkhali region has several strengths which can be leveraged by Bangladesh to augment its infrastructure and overcome its shortcomings.

- **Only deep-sea port**
  MIDI will house Matarbari port, which is the only deep seaport in Bangladesh. Commissioning of this port will provide significant cost savings and directly connect Bangladesh to international shipping lines and routes.

  This has the potential to augment logistics infra and make domestic and export-oriented manufacturing more competitive by lowering lead times and providing freight cost savings.

- **Ample land availability**
  MIDI has ample port proximate land which can utilized to build an entire port lead ecosystem including power generation via imported feedstock, EXIM dependent heavy manufacturing industries, logistics ecosystem including container yards, CFS, etc.
  For future development, large chunks of land have already been acquired by GoBD and its agencies. This readily acquired land bank can provide a head start to MIDI.

- **Greenfield plan and opportunity for integration**
  Being greenfield and planned infrastructure development, MIDI has the potential to integrate various components into a holistic and comprehensive regional development.

  Planned and phased development approach will enable targeted developments and investments into the MIDI ecosystem and help it meaningfully contribute to Bangladesh growth and prosperity.

But MIDI will have to overcome a few challenges in order for it to become a successful regional development

- **Environmental sensitivity**
  Large scale industrial and manufacturing activity at MIDI may adversely impact aquatic ecosystem and ecology. Also, Matarbari coast is prone to flooding and hence sufficient flood protection measures need to be accounted for.

- **Challenges for green field development**
  Being a greenfield development, MIDI will require meticulous planning and coordination between various GoBD departments and stakeholders to ensure implementation with a long-term outlook. Also, in short-term, MIDI will face competition from existing established ecosystems like Dhaka and Chittagong, which have necessary industrial, urban and social developments.

- **Attracting the right talent**
  MIDI is a currently sparsely inhabited coastal area. For MIDI to become a premier manufacturing and logistics hub, it needs to attract the right talent

pool from urban areas like Dhaka and Chittagong.

To attract trained and qualified workforce to MIDI, investments will need to be made in social and residential infrastructure and connectivity at MIDI.

- **Hinterland Connectivity**
  Hinterland connectivity will enable MIDI's integration with existing urban eco-systems in Bangladesh, while also helping it attract right talent.

  The currently ongoing extension and expansion of Cox's Bazar International Airport can provide a huge boost to connectivity in the region. However, a lot of will need to be done with regards to road and rail infrastructure.

The vision for MIDI will build on these discussions. Some of these themes are also discussed in detail in subsequent sections.

3.5. Case learnings

3.5.1. Cases studied

To enable a holistic view and deliver maximum impact, case learnings from journeys of similar global economic hubs were studied. The learnings from study of these global hubs have been tailored to fit MIDI's endowments.

Basis a detailed selection framework (discussed in Annexure), 9 global cases, which resonate with MIDI's potential journey, were identified. Further, 3 of these cases have been explained in detail.

Exhibit 14: Identified global cases

	Cases Studied	Port Traffic	Power Generation	Industrial Area	Relevance to MIDI
	Mundra Port & SEZ	~150 MTPA incl. ~6.5 Mn. TEUs	4,620 MW	~38,000 acres	- 1st private greenfield major port and industrial area in India; - Remote; Away from urban centres
	Tanger Med	~9 MTPA | ~7 Mn. TEUs	NA	~12,500 acres	- Clear vision for port-led export manufacturing; - Greenfield; government-led - Remote; Away from urban centres
	Map Ta Phut Industrial Estate	~42 MTPA	~3,380 MW	~4,000 acres	- Port-led bulk manufacturing hub for value addition within Thailand - Government-led - Part of larger regional vision - Remote; Away from urban centres
	Ba Ria Vung Tau	>100 MTPA | ~4 Mn. TEUs	3,900 MW	~15,000 acres	- Government-led - Remote; Away from urban centres
	Hai Phong	~5 Mn. TEUs	1,200 MW	~11,000 acres	- Government-led - Remote; Away from urban centres
	Bintulu	~48 MTPA | ~0.4 Mn. TEUs	1,100 MW	~22,000 acres	- Government-led - Started with energy as core vision, further diversified into industrial vision - Multiple implementation agencies - Remote; Away from urban centres

Pasir Gudang, Johor	40 MMTPA | 1.5 Mn. TEUs[30]	~1,700 MW	~9,000 acres	- Government-led - Part of larger regional vision
Paradip Port & Industrial Complex	114 MMTPA	366 MW	~5,000 acres	- Large POL hub - Remote; Away from urban centres - Unorganized development, later consolidated into a larger vision
Dholera Special Investment Region	-	-	~80,000 acres	- Greenfield industrial hub - Remote from urban centres

3.5.2. Strategic asks from cases

With an objective to identify best practices, we studied the identified hubs across the following dimensions:

Exhibit 15: Key strategic questions

Dimensions	Strategic Asks
Evolution and governance of large port-led economic hubs	- How did they evolve? - Do they have a vision and how are they positioned? - What is their impact on the country and region? - What are their endowments? - How are they governed?
Manufacturing Hubs- programming and investor attraction	- What are the key industrial sectors? - How does industrial hub fit into other components like port? - What are the supporting infrastructure and utilities?
Programming of the port	- How are the ports programmed to support general cargo & industrial growth? - How can ports drive efficiency?

3.5.3. Gathered insights

The following insights have emerged:

a. These hubs have traced a 15-20 year evolution, over which they have grown as projects of national & regional significance.

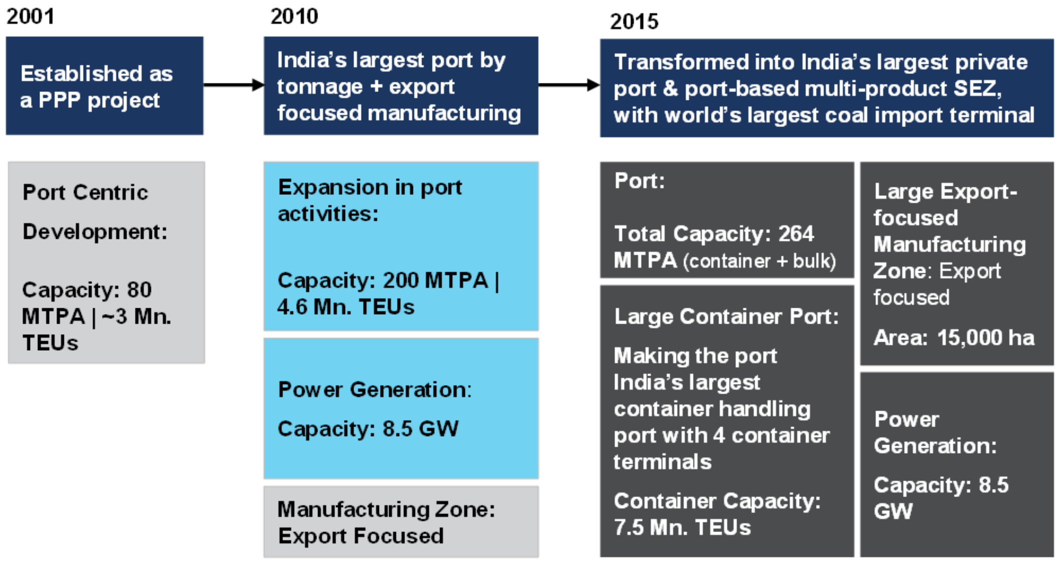
Case Study - Mundra Port & SEZ, India

Established in 2001 as a PPP project between the state maritime board and the Adani group, Mundra port is now India's largest private port. The industrial area adjoining the port now spans over ~38,000 acres, with both bulk and discrete manufacturing industries.

The Special Economic Zone also houses coal power plants generating ~8.5 GW of electricity. There has also been a recent shift towards renewable wind energy.

[30] Capacity of port; not actual traffic

Exhibit 16: Evolution of Mundra Port and SEZ



While located away from nearest metro city of Ahmedabad (~340 km), Mundra has gained spotlight due to several strengths:

- **Port efficiency and service quality -** Mundra Port came up at a time when India's west coast ports were struggling with poor service quality and capacity constraints (avg. turnaround time of 5-6 days + 2 days wait time to berth; Mundra reduced this to 18-20 hours turnaround time).

- **Great hinterland connectivity –** Over the years, Mundra has developed seamless connectivity through rail[31], expressways, airport.
  This is one of the reasons that EXIM cargo from north India prefers to travel to Mundra rather than other major ports.

- **Integrated ecosystem** – Mundra port started with the vision of evolving into a port-led industrial hub and hence, planned with integration between port, SEZ, power hub, energy import hub.

- **Ever-evolving –** Mundra's strength has been its ever-evolving nature, starting with port; then tapping into ~25% of all coal imports for India; then developing its EXIM industrial hub; paving way to tapping renewable energy wave of India (through solar panel manufacturing and wind farms) and finally creating petrochemical and LNG import infrastructure.

b. These hubs have a long-term vision, which drives their planning and development

Strategic vision drives the development and planning of the zones and holds all individual projects within the zone together. Vision statements of a few such hubs are shown below.

Case	Vision
Tanger Med, Morocco	We consider Tanger Med port as the core of a large port, logistics industrial, commercial and touristic complex" … "Mission to create **Tanger Med a trade hub between Africa and Europe**" …. And creating a "strong economic backbone, of **international scale, along with free zones allowing the region to develop its rich potential and make it an integrated regional development** model…

[31] In 2021, Mundra became the route of the first double stack container trains tested in India.

Bintulu Industrial Area & Port, Malaysia	To make Bintulu a **friendly industrial estate by 2025**
Dholera Special Investment Region, India	To develop an economically and socially balanced, **New Age Greenfield Smart Industrial city** with world-class infrastructure, sustaining a high quality of life that is green and sustainable.
NEOM city, Saudi Arabia	NEOM is a bold and **audacious dream of a New Future**, an accelerator of human progress that will embody the future of innovation in business, livability and sustainability.
Eastern Economic corridor, Thailand[32]	The completion of ready-to-implement regional development models helps to **drive economic development and Thai society to the level of a developed country in accordance with the Thailand 4.0 policy**."
Hai Phong, Vietnam	To become a regional and international logistics centre.
Ba Ria Wung Tao, Vietnam	To become a gateway to the sea of the South-eastern region and the country, a national marine economic centre, a maritime service centre of Southeast Asia.

c. **The economic potential of these hubs is unlocked with complementary activities like port, industrial area, power generation.**

As already shown above, these hubs have a combination of power, energy, manufacturing and port components, suiting their natural endowments.

For example, Bintulu first emerged as an energy hub due to its natural gas fields. Port and industrial development followed. The complementary economic activities have allowed Bintulu to emerge into a large economic hub. Today, it is a large petrochemicals and bulk industrial hub.

On the other hand, Tanger Med was planned as industrial development, supported by a port to capture EXIM traffic of Africa and Europe.

Similarly, Hai Phong emerged as a good alternate in the China+1 diversification, due to its China proximate location coupled with investment promotion policies of Vietnam. Presence of a deep-sea port facilitated transition into a large logistics hub, which eventually has expanded into a export-oriented manufacturing hub.

d. **Port-proximate manufacturing zones are preferred locations for bulk / material industries which are import dependent.**

Case Study- Map Ta Phut, Thailand

Map Ta Phut Industrial Estate is a hub for petrochemical industries. The estate houses bulk industries like fertilizers, chemicals, petrochemicals, refineries, iron & steel and other downstream industries. The port serves as a gateway to import raw materials for these industries. The bulk industries mostly serve hinterland demand.

e. **Port-proximity is also one of the key competitive factors for export-oriented value-added manufacturing.**

Case Study- Tanger Med, Morocco

Tanger Med is an export-based manufacturing hub housing discrete based manufacturing. The port here serves as a gateway for exports of finished products, majorly automotives, electronics & agricultural products.

f. **Industrial hubs are master planned for focused sectors, with globally competitive infrastructure and supported by targeted incentives for investment attraction**

[32] Eastern Economic Corridor is the larger regional programme containing Map Ta Phut port and industrial area.

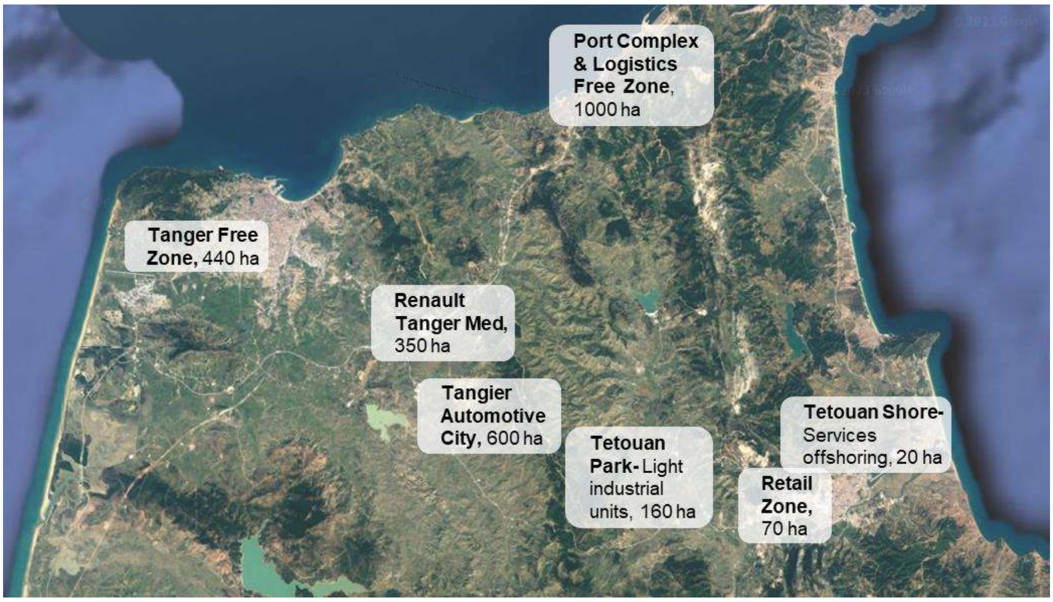
Case Study- Tanger Med, Morocco

With a land reserve of ~12,500 acres, Tanger Med Industrial complex is split into various zones basis the type of activities in each zone.

These sectoral parks are also supported and planned with dedicated infrastructure. For e.g., with more than 25 automotive factories, Tanger Med has a dedicated vehicle and a railway terminal, along with storage space for vehicles. It also has a truck loading and unloading station for export of vehicles.

Apart from custom and tax incentives like VAT exemption, financial aids etc., Tanger Med zones also provide training programs and offer one stop shop for all the processes.

Exhibit 17: Industrial zones in Tanger Med



g. **Ports are programmed for the key commodities in the industrial hub – to handle traffic efficiently at scale and drive cost-competitiveness**

Case Study- Tanger Med, Morocco

Port has several dedicated terminals, with excellent linkages to sectoral parks. For example, there is a dedicated RO-RO terminal linked to automotives park. Similarly, there are dedicated container terminals for handling EXIM traffic for free zone which manufactures electronics, processed food etc.

Similarly, Tanger Med Port handles large bunkering activity and is a major entry point for LPG imports, which supply domestic demand of LPG. Due to this, the port has a dedicated hydrocarbon terminal with ~15 MTPA capacity and 19 storage tanks.

h. **Ports become competitive and bring logistics efficiencies through interventions like digitization and outsourcing operations to private sector**

Case Study- Map Ta Phut, Thailand

Map Ta Phut port comprises of public terminals and private terminals for specific commodities. The public terminals are operated by the IEAT[33] wholly, or in PPP with private companies.

Case Study- Tanger Med, Morocco

Tanger Med Port Authority has partnered with a technology firm, to

[33] Industrial Estate Authority of Thailand

drive port efficiency through digital solutions, and improve port safety, transparency, and sustainability. The system optimizes vessel calls and simplifies EXIM process.

Exhibit 18: Operations at Map Ta Phut Port

i. **Presence of a nodal agency for governance.**

Across the studied greenfield developments, a single nodal body is responsible for defining visions, overall master planning, land allocation etc. Implementation of individual projects may further be designated to sector-specific agencies.

Case Study- Tanger Med, Morocco

Spread across 6,000 ha, Tanger Med is planned and developed by Tanger Med Special Agency, which is a fully state-owned company formed in 2002. It includes a supervisory board and an executive board for stakeholder management.

Further, TMSA has 3 special purpose vehicles under it for verticals namely, port complex, industrial complex and utilities.

Case Study - Dholera Special Investment Region, India

Dholera SIR is a greenfield industrial city being developed in West India. The project is championed by a special authority, Dholera SIR Development Authority (DSIRDA), formed through a legislative act for planning, development, management of the city. DSIRDA is owned by both central government and the state government (Gujarat) and is responsible for:

- Land acquisition
- Development planning & regulations
- Common infrastructure development
- Allotment of plots
- Private sector engagement and investment promotion
- Management and operations
- Coordination with various occupants, developers, lessees in Dholera SIR.

Exhibit 19: Governance structure in Tanger Med

Tanger Med Special Agency

Development authority to conduct studies, create development plans and mobilize funds for projects.

Supervisory Board
Highest body with members from government ministries and key external stakeholders

Executive Board
Body with members from Tanger Med's subsidiaries and key internal stakeholders

Port

Tanger Med Port Authority & Tanger Med 2

Nodal authorities to develop Tanger Med ports spread across 1,000 ha.

- Planning, development and maintenance of the port
- Regulatory & licensing authority
- Promotion & concessioning of the port

Industrial Area

Tanger Med Zones

Nodal authority to develop free zones & the industrial complex spread across 5,000 ha.

- Planning & development of the industrial complex
- Building warehouses, organizing & maintenance
- Leasing out land
- Promotion of the industrial platform

Services

Tanger Med Engineering
Providing engineers for major infrastructural projects.

Cires Technologies
Providing technology services

Tanger Med Utilities
Providing utility and maintenance services.

Case Study – Bintulu City

Bintulu is a case of organic development which was not originally planned as an industrial city.

- Bintulu Development Authority is the city authority formed with a task to create a common vision, city master development plan and to promote Bintulu as an industrial city. BDA also owns the industrial park in Bintulu.
- There are various implementation agencies for LNG projects, power generation and port. These are all government owned bodies, with common stake from the state government (Sarawak state). Further, there is cross-stake of various implementation bodies within each other. For example, Bintulu Port Berhad (owner and operator of 2 port in Bintulu) has ~29% ownership by Petroliam Nasional Berhad (Malaysian govt. oil and gas company).
- Further, the Malaysia government has created a common vision for Sarawak state under the SCORE (Sarawak Corridor of Renewable Energy) corridor plan. Much of investments made by government and private sector in Bintulu has been attracted under this plan.

Today, Bintulu is a hub for a large petrochemical and heavy material industries in Malaysia, support by 2 ports (Bintulu Port and Samalaju Port), LNG hub.

Vision 2041

4. Vision 2041

MIDI's vision has derived inputs from its original land use plan and from various government stakeholders & private industry. As a common theme from these inputs, MIDI emerges as an opportunity for Bangladesh to achieve its 2041 vision.

4.1. MIDI's Vision, Strategic Objectives & Pillars

MIDI's Vision 2041

To build an integrated economic hub for trade & investments, which can support long-term vitality & growth of Bangladesh.

Strategic Objectives or "Targets"

In 2041, MIDI's vision will be measured against the following strategic targets:

- **Boost EXIM trade and connectivity**
  by lowering international freight shipping costs by at least 20% and providing direct access to international shipping routes and lines

- **Bolster energy security**
  by handling at least 50% of national energy imports and crude refining capacity

- **Enhance value added manufacturing in Bangladesh**
  by reducing reliance on imported finished goods across POL, edible oil, plastics polymers, fertilizers and chemicals

- **Generate employment** – *by housing at least 1.5 lakh jobs within its geographic expanse*

- **Boost infra creation**
  by attracting at least USD 50 Bn in infrastructure investments over next 20 years

- **Enhance FDI inflows**
  by attracting at least USD 4 Bn in FDI and housing multinational logistics and industrial players

- **Meaningfully contributing to national output**
  by accounting for at least 5% of country's GDP by 2041

In its full form, MIDI would support vitality & growth of Bangladesh through:
- **Resilience:** Through developing greater economic muscle within the country.
- **Efficiency & Trade:** By bringing world-class logistics services resulting into cost & time savings.
- **Regional competitiveness:** Through logistics cost reduction and hence supporting growth of existing businesses and new opportunities.
- **Balanced growth:** Through creation of a new economic growth pole in South Bangladesh.

Strategic Pillars

The Moheshkhali island can transform into a hub for trade and investment in south Bangladesh, strongly founded on **3 inter-connected yet-strongly founded economic pillars:**

A. **Strategic EXIM gateway for Bangladesh, streamlining logistics, and boosting regional competitiveness.**

- *Capacity:* Increasing port capacity of Bangladesh by ~50%[34] (2041)
- *Efficiency:* Providing faster and efficient evacuation of exports from existing / planned manufacturing hubs and hence, increasing Bangladesh's export competitiveness.
- *Speed:* Reducing average 6-7 days in transit time for vessels.
- *Cost:* Bringing competitiveness to Bangladesh by 30-35% reduction in container shipping costs.

B. A vibrant industrial hub, capturing greater value-add within Bangladesh through scale and competitive logistics cost.

- Focusing on 9 key sectors, in line with Bangladesh Industrial Policy and which hold competitive advantage at port-proximate coastal location.
- Enabling new manufacturing value chains with greater value-addition opportunities, such as plastics & chemicals, within Bangladesh.
- Aiding to Bangladesh's manufacturing output and contributing to job creation.
- Creating a case-example of coastal economic activity in Bangladesh, in line with global benchmarks of export-led economies.

C. Strengthening energy security for Bangladesh through power generation, fuel imports and strategic storage.

- Handling majority of Bangladesh's fuel imports
- Providing generation capacity to cater to 20-30% of Bangladesh's power demand
- Strategic energy storage infrastructure for the country its oil and LNG needs.

4.2. MIDI's Concept

MIDI as an Integrated Economic Ecosystem

MIDI's concept has always been planned as an integrated economic ecosystem. The nomenclature "**Matarbari Moheskhali Integrated Infrastructure Development Initiative**" speaks for itself.

On these lines, the long-term concept of MIDI can be further described **as an economic nucleus (i.e. the 3 economic pillars) supported by cross-cutting social and physical infrastructure**[35]:

- Ample residential infrastructure
- Supporting social & commercial infrastructure (retail, tourism & recreation, education, healthcare)
- Robust connectivity infrastructure (rail, road, pipelines)
- Robust coastal / disaster management infrastructure (like dykes)
- Well-planned utilities (water, sewerage, solid waste)
- Enabling digital infrastructure (port 4.0, Internet of Things (IoT) in urban infrastructure, industry 4.0 etc.)

This infrastructure backbone, supported by robust policy support and streamlined governance structure will ultimately feed into making MIDI an integrated ecosystem, which can support investments.

MIDI as a hub for trade & investments

MIDI will be a new destination for investments, including FDI, into Bangladesh. The programme will see investments across sectors from development finance institutions, private sector, foreign investors.

[34] Assuming both Bay and Patenga terminals are operational by 2041

[35] The LUDP-2019 and 8 Sector Development Plans (Port, Power, Energy, Township, Water, IEZs, Roads, Railway), already developed by various implementation agencies of GoBD, lay down a good futuristic view of proposed projects / plans at MIDI across some of the listed supporting activities.

Further, driven by its deep-sea port, MIDI will be a hub for facilitating trade in Bangladesh through enabling efficient EXIM movement.

MIDI will evolve over a 18 - 20 years development pathway

As seen globally, development journeys of large integrated economic developments can be traced across 15-20 years to realize their full potential. MIDI will be no exception.

MIDI's pathway to 2041 could be traced across 3 periods spread over 18-20 years. In each period, MIDI will evolve as an economic hub taking different shapes, positioning and drivers.

Exhibit 20: MIDI's Concept as an Integrated Economic Ecosystem

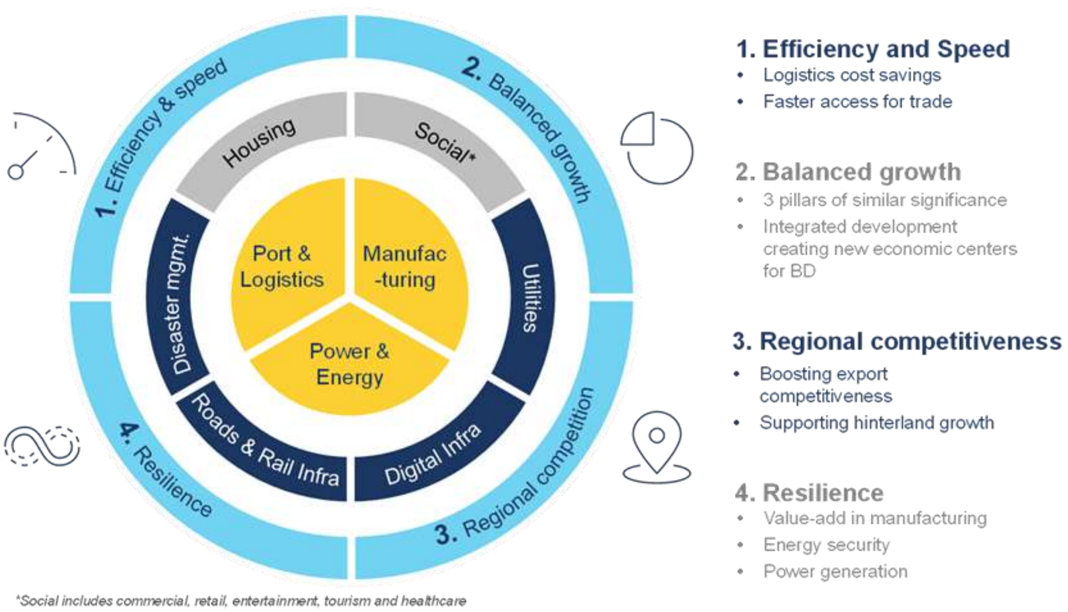
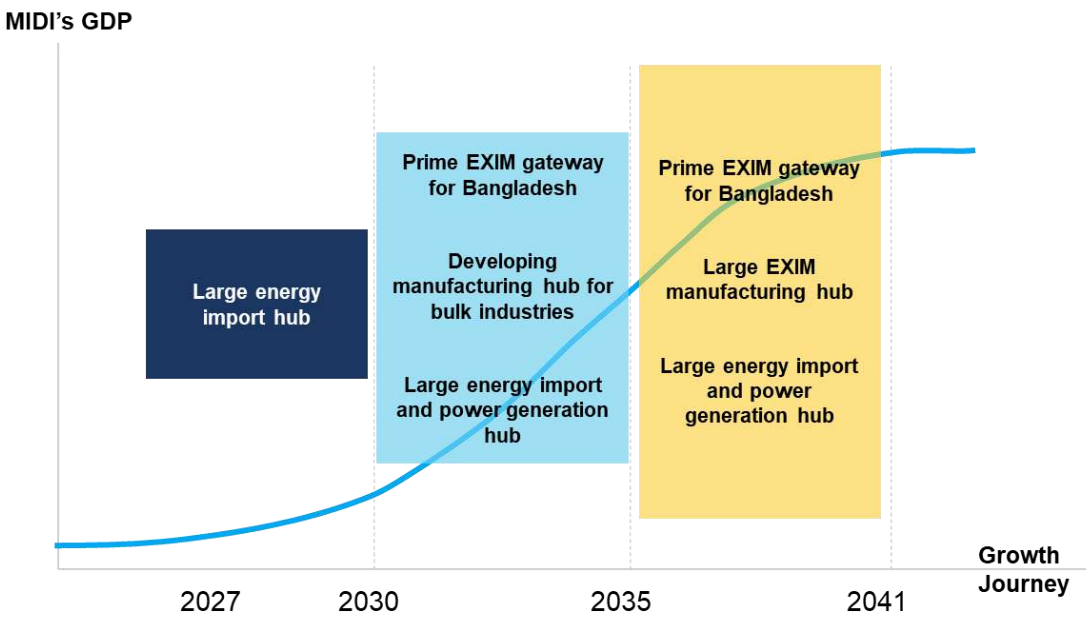
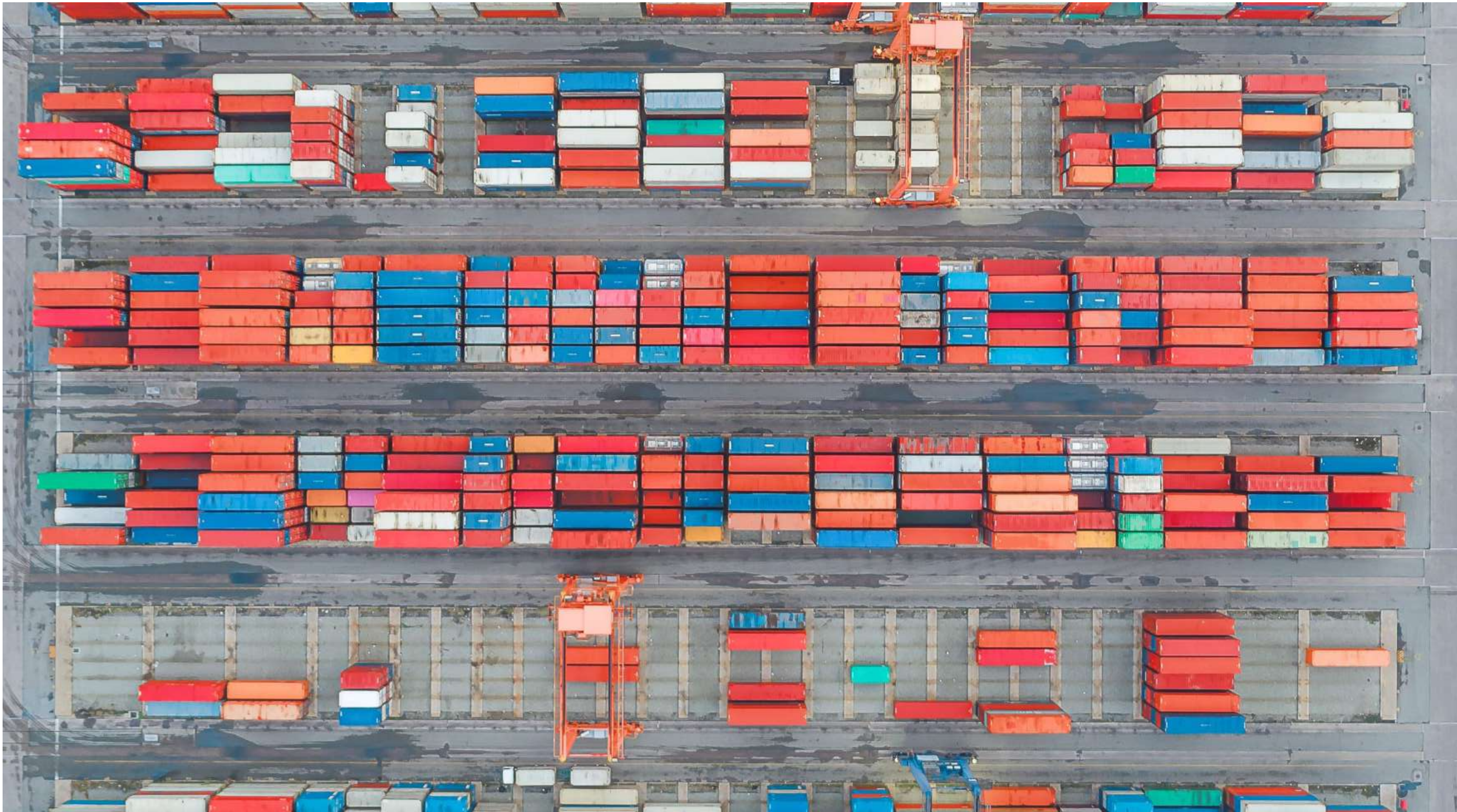
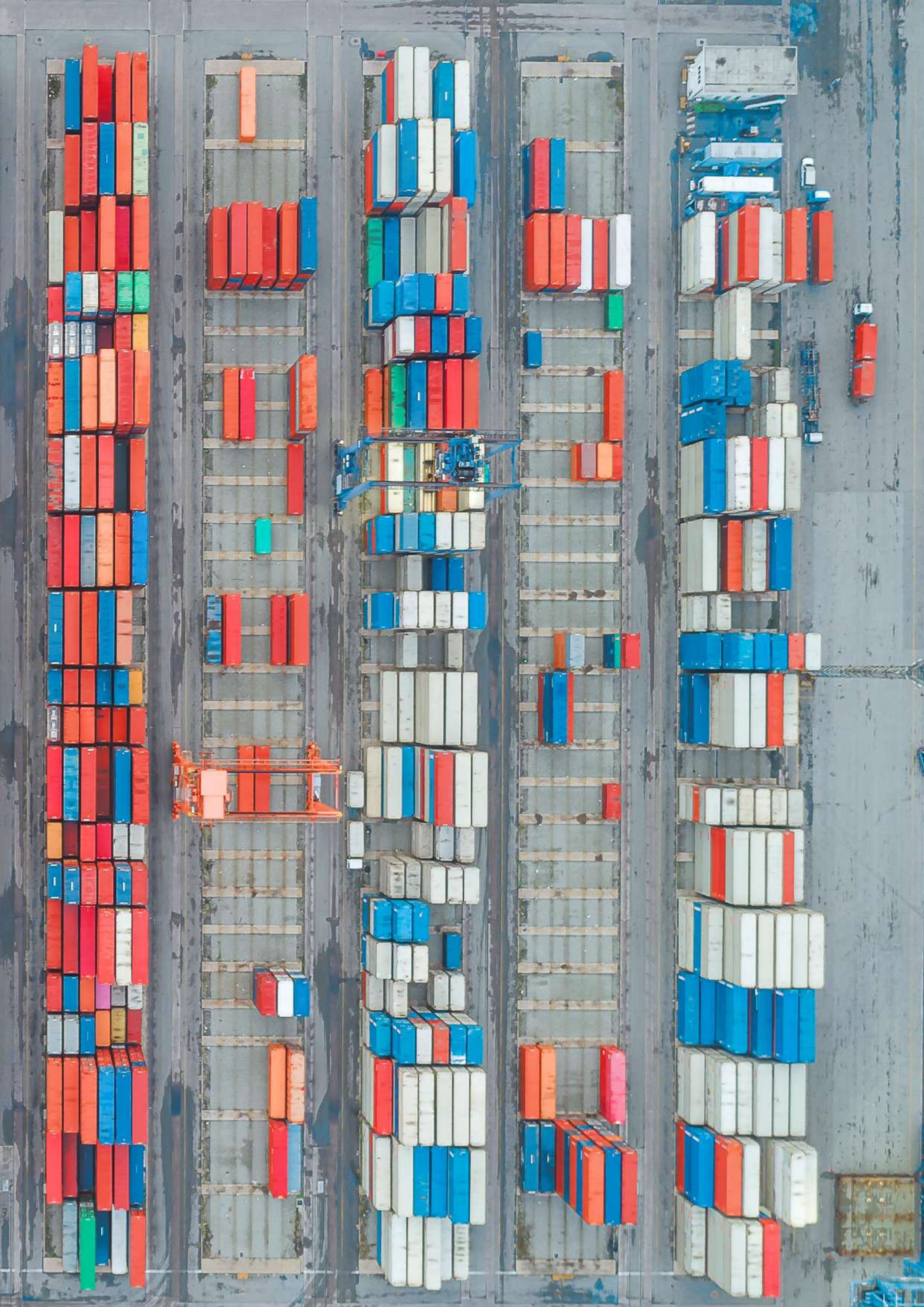


Exhibit 21: MIDI's development journey



Pillar 1: Deep Sea Port & Logistics





Key Takeaways

Bangladesh's logistics competitiveness is way behind its peers in South and Southeast Asia. As per World Bank's Logistics Performance Index 2018 rankings, the country ranked 100th out of a total of 160 countries – compared to 26th rank for China, 32nd rank for Thailand, 39th rank for Vietnam and 44th rank for India[36].

As logistics forms the backbone of supply chains across sectors and industries, logistics inefficiency is reflected in terms of limited domestic manufacturing and impeded exports potential. To overcome this logistics infrastructure challenge, Bangladesh's Perspective Plan 2021-2041 lays emphasis on *"strong improvements in trade logistics related to factory to port movements and timely inflow of imports of capital machinery and intermediate imports from ports to factory gate"* as a key improvement area for the national economy[37].

Matarbari port forms the pivot of this logistics infrastructure augmentation exercise. As the only deep seaport in Bangladesh, Matarbari can enable significant cost and time savings for EXIM cargo. This is expected to help boost domestic manufacturing and also make Bangladesh exports more competitive.

- **Matarbari port will have the ability to cater to larger deep-sea vessels plying on international shipping routes – thus ushering economies of scale and reducing the need for trans-shipment at regional ports like Singapore and Sri Lanka**

- Further, modern and mechanized cargo handling facilities can help reduce cargo handling time and pilferage loses

66-68 MTPA

Bulk and break-bulk traffic at Matarbari (2041)

4.4-5.2 Mn TEUs

Container traffic at Matarbari (2041)

25-35%

Potential shipping cost savings

With the help of adequately designed hinterland connectivity and cargo evacuation infrastructure, Matarbari can become the prime EXIM port for Bangladesh, directly linking it to key shipping lines plying on major international sea trade roues.

With this advantage, it is estimated that by 2041 Matarbari will cater to **~25% of country's bulk traffic and 36-45% of container traffic.**

[36] https://lpi.worldbank.org/international/global

[37] Perspective Plan of Bangladesh, 2021-2041

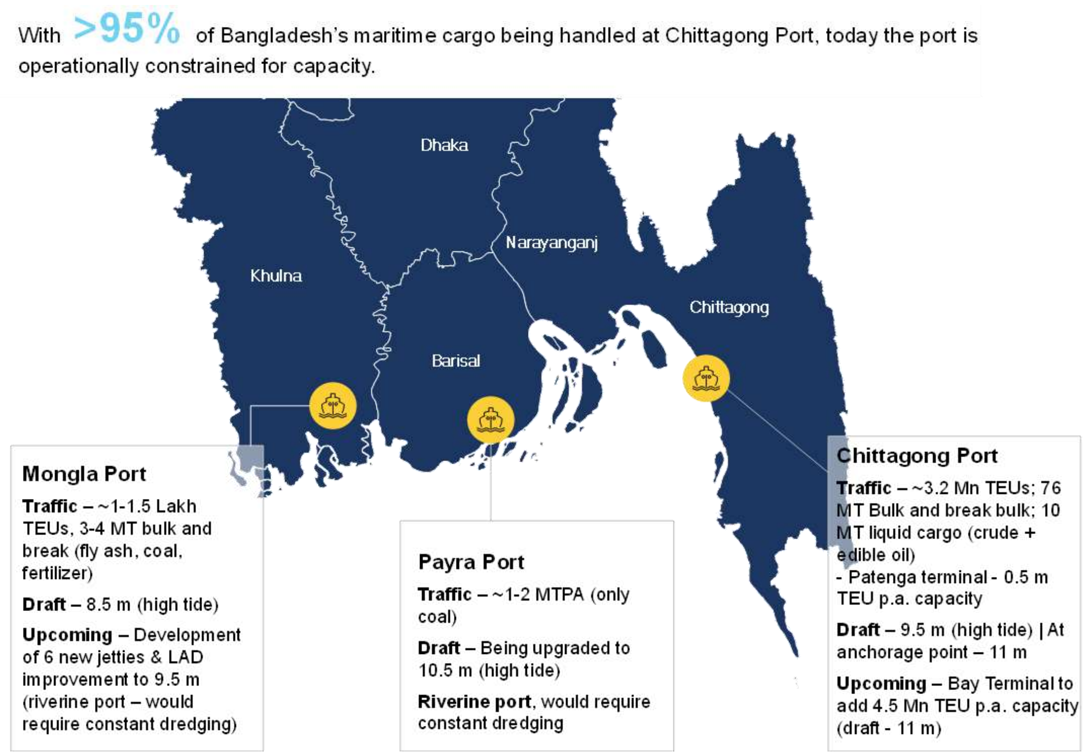
5. Pillar 1: Deepsea Port & Logistics

5.1. Bangladesh's Current Port Scenario

Bangladesh is dependent on imports for both industrial raw materials and final consumption goods. Key import commodities into Bangladesh include POL products, textiles, agri & food products, machines & electronics, steel, cement raw materials, fertilizers, plastics & chemicals and automobiles & auto parts.

On the other hand, exports from Bangladesh are largely limited to ready-made garments (RMG) which contribute >80% of all national exports[38]. Bangladesh's EXIM trade is currently split across 3 ports, namely – Chittagong port, Mongla port and Pyra port. All these ports have limited drafts ranging from 8.5 m to 11 m and are incapable of hosting larger vessels sailing on international routes. Of these 3, Chittagong port is the most prominent which handles >95% of Bangladesh's maritime cargo.

Exhibit 22: Major seaports in Bangladesh



[38] Foreign Trade Statistics of Bangladesh – Bangladesh Bureau of Statistics

5.1.1. Constraints at Chittagong Port

Being an old and congested development, Chittagong port faces multiple constraints. This section elaborates on these constraints and their implication on movement of cargo via Chittagong port.

Constraints: Bulk, break-bulk cargo

Chittagong utilizes a combination of Kutubdia anchorage, outer port anchorage and multipurpose port berths to cater to bulk and break-bulk vessels. Given limited draft viability, only smaller vessels ranging between 40,000-60,000 DWT are catered to by the Chittagong ecosystem (including anchorage points).

Channel and draft constraints

- Chittagong is a riverine port situated on Karanphuli river with maximum draft being limited to 9.5 m during high tide. Further, movement of ships has high tidal dependency.
- This restricts vessel size to 15,000-20,000 DWT for unloading at berth.
- Additionally, maximum LAD of ships limited to ~150-190 m[39] due to a large bend in the river.
- Also, as width of the channel is ~250 m, only a limited number of vessels can enter / exit the channel.
- Hence, most bulk vessels need to be unloaded at outer anchorage point of the port.

Multiple lighterage requirement

- Capacity of outer anchorage points at Chittagong port is also limited to 30,000-40,000 DWT vessels due to draft constraints (~11 m). Hence, lighterage for large vessels is required off-Kutubdia island, before the vessel can enter Chittagong anchorage area.
- Bulk carrier of 50,000-60,000 DWT arrives off-Kutubdia island, where lighterage happens at extremely slow pace (8,000-10,000 tons per day) due to high rolling. Hence, unloading of 10,000-15,000 tons takes ~1.5-2 days.
- The vessel with ~40,000 DWT cargo then reaches outer anchorage where remaining cargo is unloaded onto barges (in 4-5 days) for river transport. Unloading rate at outer anchorage is 10,000-12,000 tons per day.
- If required, vessel with limited cargo of only 10,000-20,000 DWT may be brought to Chittagong port berth for onshore offloading.

[39] Variation between night and day

These multiple lighterage operations have huge time and cost (including cargo loss in handling) implications of bulk and break-bulk cargo at Chittagong port.

Exhibit 23: Bulk cargo movement at Chittagong port

Current movement of inbound cargo

1. Lighterage at Kutubdia island
2. Outer anchorage point at Chittagong
3. Berthing at Chittagong port OR Travel via barge to hinterland

Matarbari being a deep seaport will be able to directly cater to larger vessels at its berth and eliminate the need for multiple lighterage operations.

Constraints: container cargo

Movement of container cargo to and from Chittagong happens via smaller feeder vessels – connecting Chittagong to larger mother vessels plying on major international sea routes and calling at transhipment ports in South and South-east Asia.

Channel and draft constraints
Due to multiple channel and draft constraints highlighted above, only smaller feeder ships with a capacity of 1,000-2,000 TEUs are handled at Chittagong port.

Need for transhipment
Give vessel size constraints at Chittagong, there is a need for transhipment of Bangladesh bound container cargo at various ports in South and South-east Asia.

- Mother vessels or larger ships (~10,000 TEUs) plying on international sea routes offload Bangladesh bound cargo onto smaller feeder vessels (1,000-2,000 TEUs) at transhipment hubs like Singapore and Colombo
- These feeder vessels then carry Bangladesh bound cargo to Chittagong
- This result in significant delay (due to transhipment) and higher costs (associated with smaller vessels and transhipment operations)

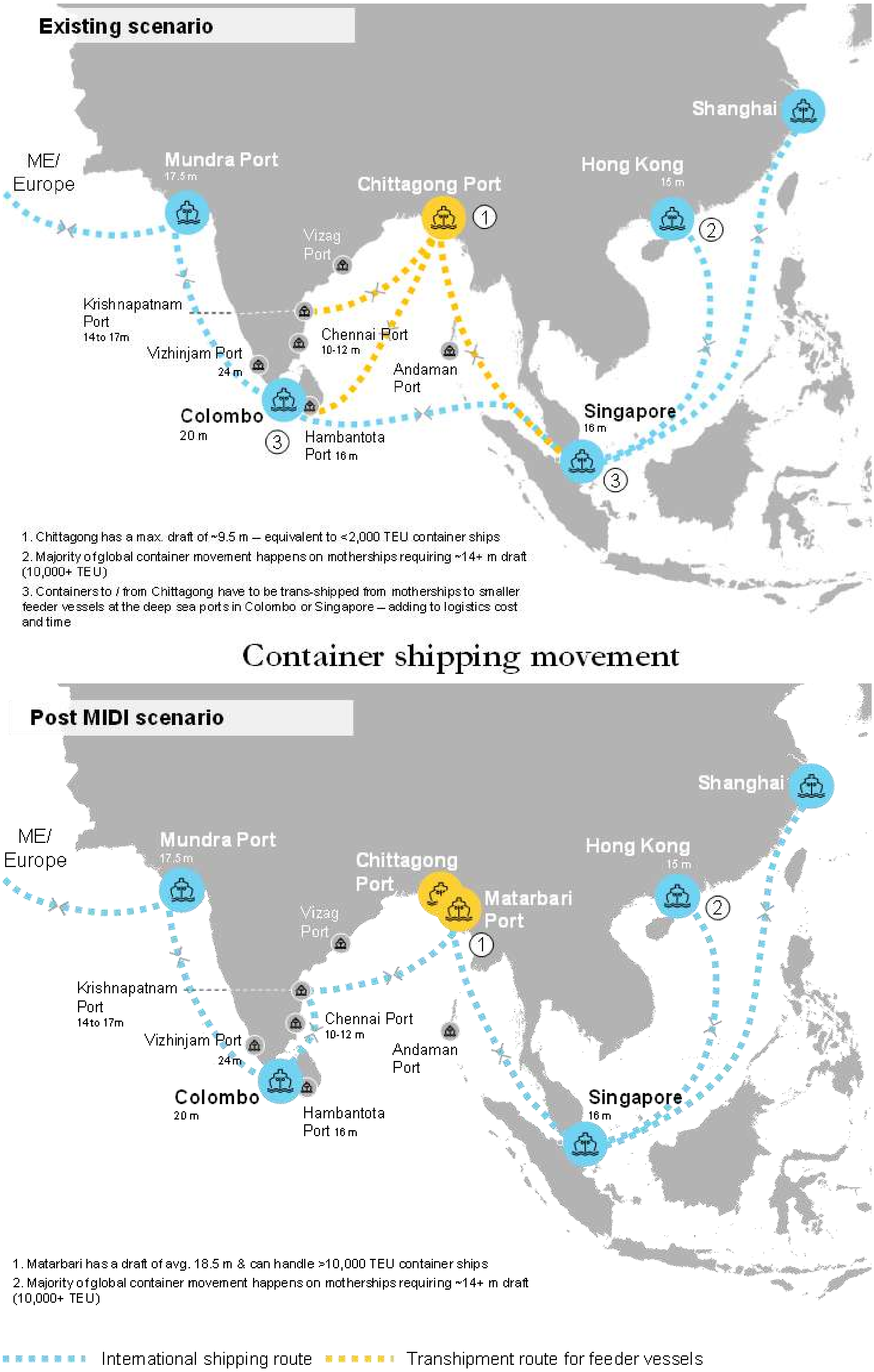
Matarbari being a deep seaport will be able to directly cater to larger mother vessels at its berth and eliminate the need for transhipment of Bangladesh bound container cargo.

Upcoming developments

New container handling capacity coming up at Chittagong will only serve to declutter Chittagong & Dhaka bound traffic by offering additional berth space.

- Patenga container terminal is recently completed and awaiting private operator selection. But it also faces draft and backyard space constraints similar to Chittagong Port.
- Further, Chittagong Port Authority’s ambitious Bay Terminal (~12 m draft) project has just completed feasibility. With Matarbari Port coming up, the timeline for this project is not certain.

Exhibit 24: Existing and post MIDI scenario for container cargo movement



Other constraints

Other constraints at Chittagong include:

- Being old and capacity constrained, Chittagong port still works on mix of manual and mechanized cargo processing and limited crane capacity. This results in higher turnaround time (TAT) at Chittagong port vs other ports. TAT at Chittagong port is 2.45 days compared to ~1 days at Singapore and Bangkok ports.

- Lack of supporting infra including adequate container storage yard, rail linked container terminal also limits cargo handling capacity at Chittagong. Also, to avoid over-crowding at port, CPA offers limited free container storage period of 4 days[40], after which daily demurrage charges are levied. This increases logistics cost for import and export of goods.

Considering the current constraints, development of Matarbari deep-sea port can be a game changer for logistics in Bangladesh.

5.2. MIDI's competitiveness

Matarbari port is expected to have a draft of ~18.5 m[41] – comparable to drafts of other leading ports in the region (Krishnapatnam 17 m, Colombo 20 m, etc.). Being a deep seaport, Matarbari is likely to overcome the challenges and constraints for both bulk and container cargo.

5.2.1. Competitiveness – Bulk and break-bulk cargo

Matarbari port will offer multiple advantages:

- Deep-sea port will allow large vessels (80,000-100,000 DWT) to directly call at the port translating to lower costs via economies of scale and lower per ton sailing costs for larger vessels.

- High draft (18.5 m) and sufficient availability of berths will eliminate lighterage and hence reduce wastage due to multiple handling.

- Efficient handling and equipment availability at Matarbari port will allow faster unloading and lower turn-around time for ships.

Cost and time comparison for EXIM cargo via Matarbari and Chittagong port is shown below.

Overall, it is founded that Matarbari Port can bring out following savings for bulk / break-bulk cargo to Bangladesh:

- **25-30% shipping cost savings**
- **16-20% total logistics cost savings**
- **3-4 days' inventory holding cost savings**

[40] In line with other ports – Colombo: 7 days (import) and 12 days (export); Singapore: 3 days (import and 8 days (export)

[41] Min. 16 m in low-tide; Average 18.5 m

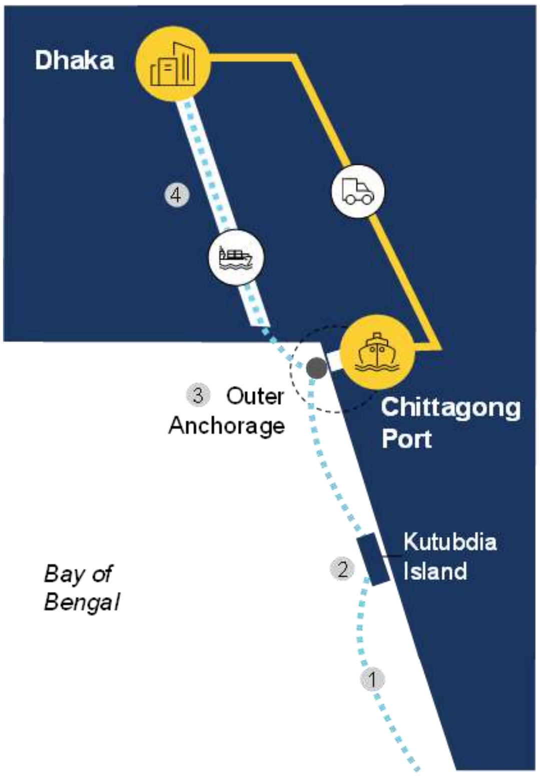
Case Example 1: Movement of imported bulk cargo via barges to Dhaka / Narayanganj

- Commodity: Limestone / clinker for nearby cement manufacturing plants
- OD pair: UAE (Dubai Port) – Chittagong Port | Matarbari Port
- Systemic cost analysis – Import of limestone chips from UAE
    - **Total shipping cost savings – USD 4-5/ton** (25-30% of savings vs current costs)
    - **Total end – to – end transport cost savings – USD 4-5/ton** (16-20% costs savings vs. current costs)
    - **Additionally, inventory holding costs savings – USD ~0.1/ton** (3-4 days saved)

Exhibit 25: Case Example 1 - Comparison of movement of bulk cargo

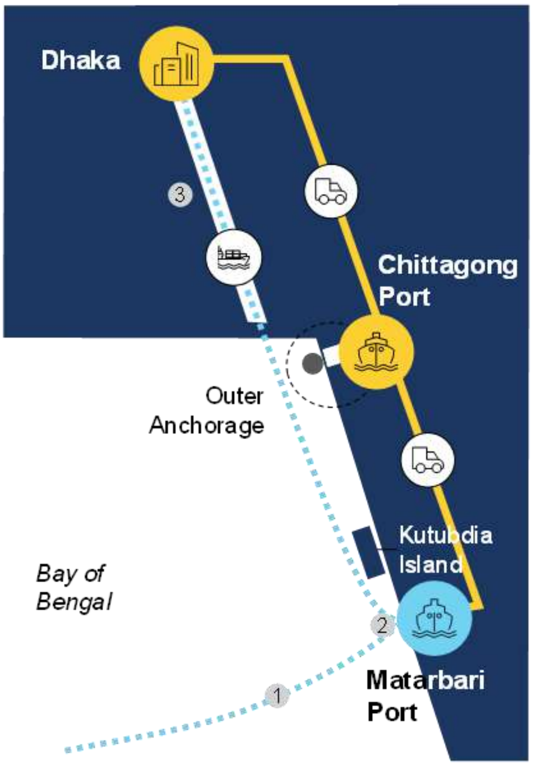
Via Chittagong: Bulk to Dhaka via inland waterways

1. Ship cruise from Origin Port to Kutubdia Island → 2. Lighterage of 10,000-15,000 tons at Kutubdia → 3. Wait time and unloading at Chittagong port outer anchorage → 4. Transport via barges to Dhaka



Via MIDI: Bulk to Dhaka via inland waterways

1. Ship cruise from Origin Port to Matarbari Port → 2. Unloading at Matarbari port berth → 3. Transport via barges to Dhaka



	Handymax (Chittagong)		Post Panamax (MIDI)	
Vessel Size (DWT)	**40,000-50,000 DWT**		**80,000 – 1,00,000 DWT**	
	USD/ton	**Time**	**USD/ton**	**Time**
1. Origin Port - Port dues and handling charges	5	11-12 days	5	11-12 days
2. Shipping / freight	11		6	
3. Destination Port - Port dues and handling charges	1	4-5 days	1-2	~2 days
4. Wastage at each loading/unloading operation	0.15	-	0.05	-
Total shipping cost	**17**		**13**	
5. Barge to Narayanganj	~7	2-3 days	~7	~3 days
6. Unloading at Narayanganj	1		1	
Total transport cost / time	**25**	**18- 20 days**	**21**	**~16 days**

Notes:

1. Shipping costs are actual operating costs of running a ship. Actual charge / price varies considerably based on seasonal demand, margins, return cargo etc.
2. Origin Port considered as Fujairah / Dubai Port, UAE (~3,475 nm from Chittagong). Origin port dues and handling charges considered as per Dubai Port latest published tariff.
3. Shipping / freight
    a. Cost of shipping / freight includes
        i. Cost of ship in movement = Fixed + variable fuel costs, for respective vessel type [Handymax - USD ~32,000 per day | Panamax – USD ~38,000 per day | Post Panamax – USD ~41,000 per day]
        ii. Cost of standing ship at port / berth = Fixed costs for respective vessel type [Handymax - USD ~16,800 per day | Panamax – USD ~22,000 per day | Post Panamax – USD ~23,200 per day]
    b. Ships speed @12-14 knots for all vessels
4. Destination Port
    a. Considered as Chittagong Port for Handymax vessel.
        i. Costs include
            - Actual Port Dues (Taka ~33 per ton) at Chittagong Port
            - Actual cost of lighterage at Kutubdia island + complete discharge at outer anchorage of Chittagong Port (Taka ~70 per ton)
        ii. Time includes
            - Time for lighterage of 15,000 ton @8,000 ton per day at Kutubdia Island
            - Complete discharge for last cargo (i.e., 25,000 ton) @10,000 ton per day at outer anchorage point
    b. Considered as Matarbari Port for Post Panamax vessels
        i. Costs include
            - Port Dues assumed as same at Chittagong Port (Taka ~33 per ton)
            - Stevedoring costs assumed same as unloading costs at Chittagong Port (Taka 60 per ton). This may actually be higher because of use of crane equipment at Matarbari Port.
            - Additional berth charge / wharfage charge at Matarbari Port assumed same as Colombo Port (USD 0.28 per 100 GT per hr)
        ii. Time includes
            - Time for discharge of 40,000 tons at Matarbari Port berth at ~20,000 ton per day [Assuming 2 x mobile harbor cranes for mechanized handling]
5. Wastage / pilferage loses
    a. Loading-unloading losses – 2% for Chittagong; 0.5% for Matarbari
6. Barge to Narayanganj assumed for last cargo out of vessel as per existing costs. Existing rates from Outer anchorage till Narayanganj is Taka 680 and Kutubdia to Outer anchorage is Taka 55-60. It is assumed that costs from Matarbari port will be same as cost from Kutubdia.
7. Unloading costs taken as per current rates Taka 85 per ton.

Case Example 2: Movement of imported bulk cargo via truck to Chittagong

- Commodity: Scrap steel for steel plants at Chittagong
- OD pair: USA East Coast (New Jersey Port) – Chittagong Port | Matarbari Port
- Systemic Cost Analysis
    - **Total shipping cost savings – USD 14-15/ton** (25-30% of savings vs current costs)
    - **Total end – to – end transport cost savings – USD 9-10/ton** (16-18% of savings vs current costs)
    - **Additionally, inventory holding costs savings – USD ~0.5/ton** (~3 days saved)

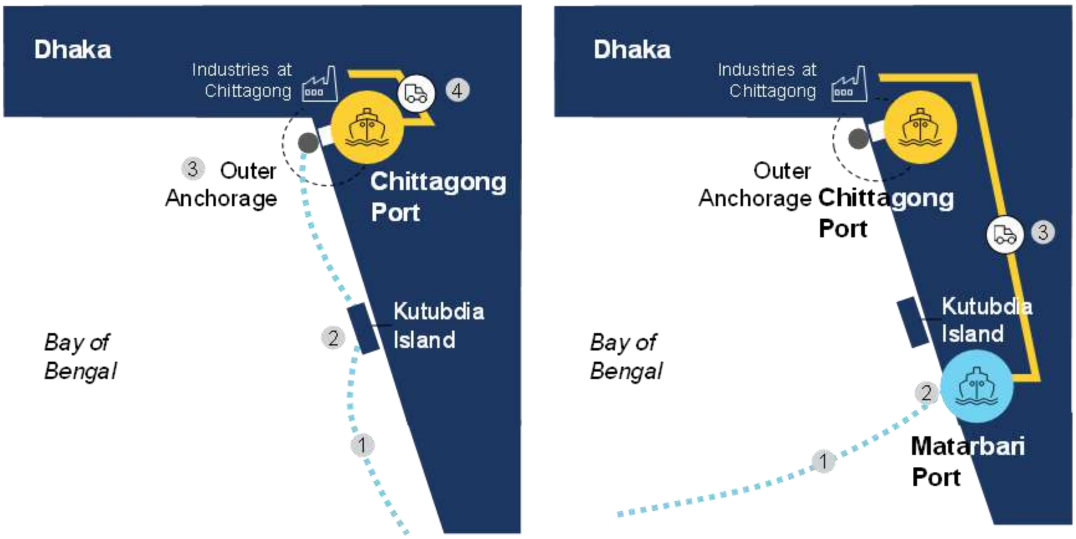
Exhibit 26: Case Example 2 - Comparison of movement of bulk cargo

Via Chittagong: Bulk to Chittagong via inland road

1. Ship cruise from Origin Port to Kutubdia Island → 2. Lighterage of 10,000-15,000 tons at Kutubdia → 3. Wait time and unloading at Chittagong port outer anchorage → 4. Truck transport to industries at Chittagong

Via MIDI: Bulk to Chittagong via inland road

1. Ship cruise from Origin Port to Matarbari Port → 2. Unloading at Matarbari port berth → 3. Truck transport to industries at Chittagong



	Handymax (Chittagong)		Post Panamax (MIDI)	
Vessel Size (DWT)	**40,000-50,000 DWT**		**80,000 – 1,00,000 DWT**	
	USD/ton	**Time**	**USD/ton**	**Time**
1. Origin Port - Port dues and handling charges	15	32 days	15	32 days
2. Shipping / freight	28		17	
3. Destination Port - Port dues and handling charges	2-3	4-5 days	2-3	~2 days
4. Wastage at each loading/unloading operation	5-6	-	~1.5	-
Total shipping cost	**50-52**		**36-37**	
5. Truck loading costs	3	0.5 days	3	1 day
6. Truck up to Chittagong steel mills	3-4		8	
7. Unloading at Chittagong steel mills	3		3	
Total transport cost / time	**59-61**	**36-38 days**	**50-51**	**34-35 days**

Notes:

1. Shipping costs are actual operating costs of running a ship. Actual charge / price varies considerably based on seasonal demand, margins, return cargo etc.
2. Origin Port considered as New Jersey Port, USA (~10,970 nm from Chittagong). Origin port dues and handling charges considered as per Dubai Port latest published tariff.
3. Shipping / freight
    a. Cost of shipping / freight includes

        i. Cost of ship in movement = Fixed + variable fuel costs, for respective vessel type [Handymax - USD ~32,000 per day | Panamax – USD ~38,000 per day | Post Panamax – USD ~41,000 per day]
        ii. Cost of standing ship at port or berth = Fixed costs for respective vessel type [Handymax - USD ~16,800 per day | Panamax – USD ~22,000 per day | Post Panamax – USD ~23,200 per day]
    b. Ships speed @12-14 knots for all vessels
4. Destination Port
    a. Considered as Chittagong Port for Handymax vessel.
        i. Costs include
            - Actual Port Dues (Taka ~33 per ton) at Chittagong Port
            - Actual cost of lighterage at Kutubdia island + complete discharge at outer anchorage of Chittagong Port (Taka ~70 per ton)
        ii. Time includes
            - Time for lighterage of 15,000 ton @8,000 ton per day at Kutubdia Island
            - Complete discharge for last cargo (i.e., 25,000 ton) @10,000 ton per day at outer anchorage point
    b. Considered as Matarbari Port for Post Panamax vessels
        i. Costs include
            - Port Dues assumed as same at Chittagong Port (Taka ~33 per ton)
            - Stevedoring costs assumed same as unloading costs at Chittagong Port (Taka 60 per ton). This may actually be higher because of use of crane equipment at Matarbari Port.
            - Additional berth charge / wharfage charge at Matarbari Port assumed same as Colombo Port (USD 0.28 per 100 GT per hr)
        ii. Time includes
            - Time for discharge of 40,000 tons at Matarbari Port berth ~-25,000 ton per day [Assuming 2 x mobile harbor cranes for mechanized handling]
5. Wastage / pilferage loses
    a. Loading-unloading losses – 1.5-2% at Chittagong; ~0.5% at Matarbari
6. Truck loading cost (Taka 4,500 per 15-ton loading on truck) assumed as per actual rates from Customs & Freight (C&F) agents.
7. Truck transport costs from port to Chittagong steel mills
    a. Chittagong port to steel mills – Taka 5000
    b. Matarbari port to Chittagong steel mills – Taka 12,000
    c. Truck unloading costs assumed same as loading costs.

5.2.2. Competitiveness – Container cargo

Matarbari port will offer multiple advantages:

- Deep-sea port will allow larger mother vessels (~10,000 TEUs) to directly call at the port translating to lower costs via economies of scale and lower per ton sailing costs for larger vessels.

- This will further eliminate the costly and time-consuming transhipment from Singapore or Colombo.

- Efficient handling and equipment availability at Matarbari port will allow faster unloading and lower turn-around time for ships

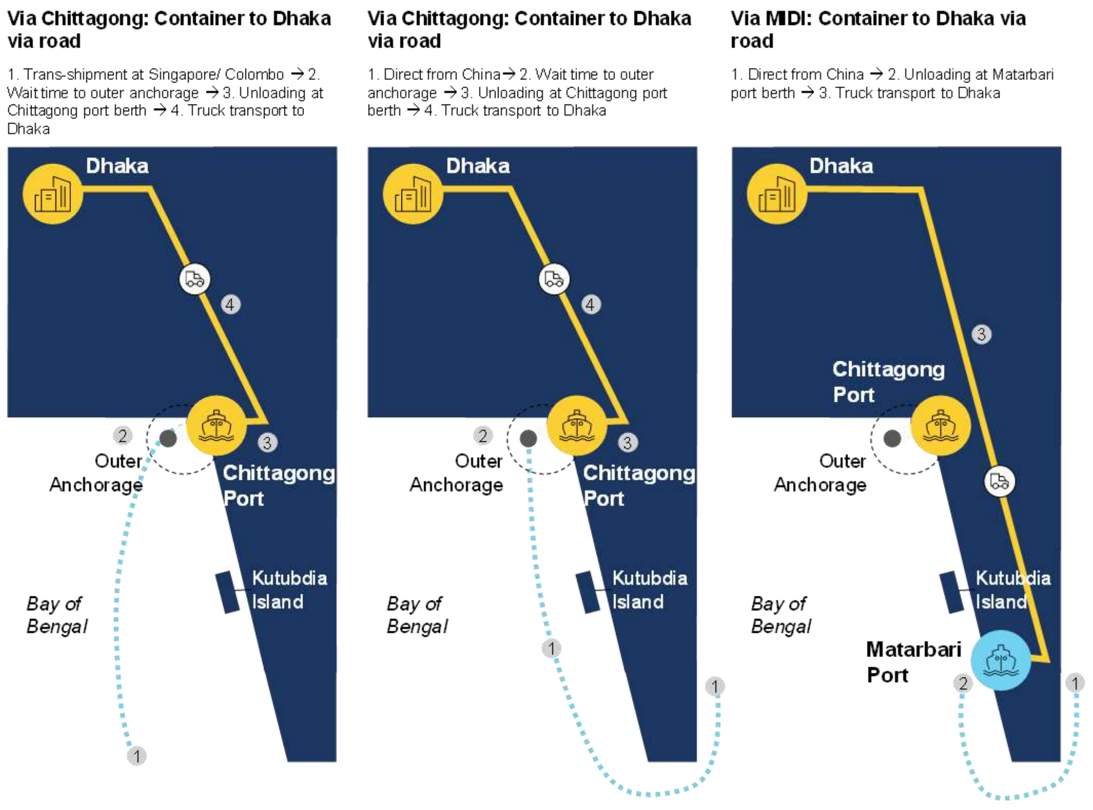
It is estimated that, Matarbari Port can bring about the following savings:

- **30-35% shipping cost**
- **~10% total logistics cost**
- **6-7 days' savings in inventory holding**

Case Example 3: Movement of imported container to Chittagong / Dhaka

- Commodity: inbound container cargo
- OD pair: China (Shanghai) to Chittagong | Matarbari Port
- Comparison – (i)Transhipment via Singapore VS (ii) smaller feeder vessel directly from China VS (iii) mother vessel directly calling at Matarbari port
- Systemic cost analysis
  - **Total shipping cost savings – USD 130 / TEU** (30-35% of costs savings vs current)
  - **Total end – to – end transport cost savings – ~USD 25 / TEU for Dhaka bound container** (~5% of savings vs current costs) **| ~USD 55 / TEU for Chittagong bound container** (~10% of costs savings vs current costs)
  - **Additionally, inventory holding costs savings – USD ~30-40/ton** (6-7 days saved)

Exhibit 27: Case Example 3 - comparison of movement of container cargo



	Indirect to Chittagong via Singapore MV-8,000-10,000 TEU; FV-1,500 TEU		**Direct to Chittagong FV - 1,500 TEUs**		**Direct to Matarbari MV-8,000-10,000 TEU**	
	USD/TEU	**Time**	**USD/TEU**	**Time**	**USD/TEU**	**Time**
1. Origin Port - Port dues and handling charges	50	5 days	50	13-14 days	50	10-11 days
2. Shipping / freight to Singapore	56		339		197	
3. Waiting & Trans-shipment	117	5 days				
4. Shipping / freight to Chittagong	147	5 days				
5. Destination Port - Port dues and handling charges	50	3-4 days	50	3-4 days	50	1-2 days
Total shipping cost	**419**	19-20 days	**439**	16-18 days	**297**	12-13 days
Container up to Dhaka						
6. Container unstuffing and truck loading	90	1 day	90	1 day	90	1-2 days
7. Truck up to Narayanganj	150		150		250	
Total transport cost	**659**	20-21 days	**679**	17-19 days	**637**	13-15 days
Container up to Chittagong						
6. Container unstuffing and truck loading	90	0.5 days	90	0.5 days	90	1 day
7. Truck up to Chittagong	50		50		120	
Total transport cost	**562**	19-21 days	**579**	16-18 days	**507**	13-14 days

Notes:

1. Shipping costs are actual operating costs of running a ship. Actual charge / price varies considerably based on seasonal demand, margins, return cargo, etc.
2. Origin Port considered as Shanghai Port, China (~4,520 nm from Chittagong). Origin port dues and handling charges considered as per Singapore Port latest published tariff.
3. Shipping / freight
    a. MV – Mother vessel | FV – Feeder vessel
    b. Cost of shipping / freight includes
        i. Cost of ship in movement = Fixed + variable fuel costs, for respective vessel type [1,500-2000 TEUs – USD ~34,000 per day | 8,000-9,000 TEUs - ~95,000 per day]
        ii. Cost of standing ship at port / berth = Fixed costs for respective vessel type [1,500-2000 TEUs – USD ~14,000 per day | 8,000-9,000 TEUs - ~56,000 per day]
    c. Ship speed @12-13 knots for 1,500-2,000 TEU and 16-17 knots per day for 8,500 TEUs
4. Waiting & trans-shipment at Singapore port
    a. Assuming a 1.5 days' time for both mother vessel and feeder vessel for trans-shipment.
    b. Assuming stevedoring cost at Singapore port as per tariff publication.
5. Shipping / freight to Chittagong - Assumed at same rates as for China-Singapore journey.
6. Destination Port
    a. Considered as Chittagong Port for 1,500-2,000 TEU vessel
        i. Costs include
            - Actual Port Dues and unloading cost at Chittagong port
            - Demurrage charges at Chittagong Port not considered – Currently Chittagong Port charges demurrage from fifth day of storage @USD 6 per TEU.
        ii. Time includes
            - Time for discharge of 1,500 TEUs taken at ~400-450 TEU per day.
    b. Considered as Matarbari Port for 8,500 TEU vessel
        i. Costs include
            - Port dues + Stevedoring costs at Singapore port
        ii. Time includes
            - Time for discharge of 1,500 TEUs taken at ~1,000-1,200 TEUs per day (assuming 2*RTG cranes)

5.3. Matarbari Traffic Projections

Given Matarbari's competitive positioning, the port can capture significant proportion of Bangladesh's EXIM traffic. It is expected that in long-term, Chittagong Port and Matarbari Port will cater to majority EXIM cargo; while other ports with limited draft are expected to mostly be used for inland water transport and coastal shipping.

5.3.1. Container traffic projections

Bangladesh

Container traffic in Bangladesh has been projected as 12.2-16.2 Mn TEUs in 2041, in line with GDP growth in the following 2-scenarios:

Scenario 1 – GDP growth rate as per IMF - 6.3%[42]

Exhibit 28: Bangladesh container traffic projections - Scenario 1

	2021	2030	2041
Total Container Traffic (Mn TEUs)	**3.3**	**6.6**	**12.2**
Import	1.8	3.3	6.1
Export, incl. empties	1.5	3.3	6.1

Scenario 2 – GDP growth rate as per lower range (In-between) of IEPMP - 7.8%

Exhibit 29: Bangladesh container traffic projections - Scenario 2

	2021	2030	2041
Total Container Traffic (Mn TEUs)	**3.6**	**7.6**	**16.2**
Import	1.8	3.8	8.1
Export, incl. empties	1.5	3.8	8.1

MIDI

Addressable traffic at MIDI –
Being the only deep seaport, MIDI will be able to capture 36-43%[43] of the total container traffic in Bangladesh.

Actual traffic at MIDI –
It is expected that traffic would gradually ramp up from ~10% of addressable traffic (in starting year 2027, when Phase 1 / Stage 1 is operational) to 100% of addressable traffic in 10th year of operations. Further, Scenario 1 for Bangladesh container traffic (2041 – ~12.2 Mn TEUs and 2030 - ~6.6 Mn TEUs) has been assumed as the more likely scenario for final traffic considerations.

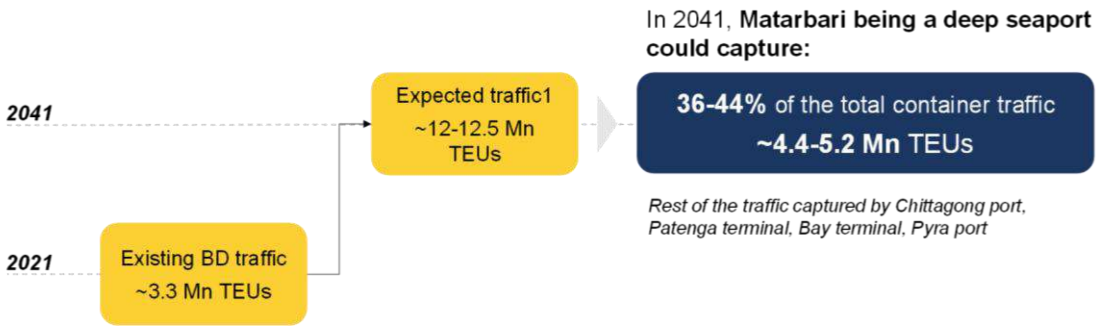
Hence, expected traffic for MIDI:
- **2030[44] – ~1-1.2 Mn TEUs**
- **2041 – ~4.4-5.2 Mn TEUs**

[42] Long term container growth considered in line with GDP growth (Note – GDP growth rate at constant prices over FY17-FY21 was 6.4% while Chittagong's container volume growth over the same period was 4.8%. However, long term container growth considered in line with GDP growth)

[43] As per Dhaka-Chittagong-Coxs Bazar Rail Project Preparatory Facility Final Feasibility Study Report, ~36% of Bangladesh's total TEU traffic has been allocated to MIDI port. However, given deep draft at Matarbari Port enabling the movement of larger ships and associated cost and time savings - larger share of container traffic is expected to be catered by MIDI. Further, FS report allocated a large share of traffic to Pyra Port, which is no longer viable due to curtailment of Pyra Port plans. This gap can be easily addressed by Matarbari.

[44] 2030 refers to the FY31 i.e. period spanning July 1, 2030 to June 30, 2031

Exhibit 30: Container traffic projections at Matarbari Port



5.3.2. Bulk /break-bulk traffic projections

Bangladesh

Commodity wise bulk and break-bulk traffic have been projected using 2 scenarios similar to container traffic:

- GDP growth scenarios at 6.3% IMF (lower range) – ~156 MTPA (2030) | ~266 MTPA (2041)
- GDP growth scenarios at 7.8% IEPMP (upper range) - ~170 MTPA (2030) | ~330 MTPA (2041)

Exhibit 31: Bangladesh bulk and break-bulk traffic projections

Commodity (MTPA)	2021	Growth	Growth - rational	2030	2041
Imports	**78.2**	-	-	**155-170**	**265-330**
Bulk					
Food grains	5.1	0.7%	population	5.4	5.8
Cement clinker	34.9	6.9% / 8.6%	GDP x 1.1 (elasticity)	68-80	133-180
Coal	3.0		IEPMP	24	29
Scrap	2.6	6.3% / 7.8%	GDP x 1 (elasticity)	4.7-5.4	8.7-11.5
Stone / crushed stone	7.9	6.3% / 7.8%	GDP	14.5-16.7	26.8-35.4
Other bulk commodities	17.4	5.0%	-	28.3	46.1
Imported bulk at Mongla/ Payra	3.0	6.3% / 7.8%	GDP	5.5-6.4	10.2-13.5
Break Bulk					
Fertilizer	1.7	0.0%	Constant imports	1.7	1.7
Salt	0.4	0.7%	population	0.5	0.5
Sugar	2.2	0.7%	population	2.4	2.6
Exports	**0.5**	*6.3% / 7.8%*	GDP	**0.8-1.0**	**1.5-2.0**
TOTAL	**78.6**			**156-170**	**266-330**

Bulk vs break bulk split is as below:

Commodity (MTPA)	2021	2030	2041
Bulk	**73.9**	**151-166**	**260-322**
Breakbulk	**4.8**	**5.0-5.5**	**6.0-7.0**
TOTAL	**78.6**	**156-170**	**266-330**

MIDI

Addressable traffic at MIDI will depend upon the commodity. Following assumptions are taken for various commodities, basis discussions with private sector:

- Cement clinker and stone / crushed stone – Most cement grinding units are present in riverine regions of Dhaka and may end up still going via Chittagong / Mongla / Pyra ports. In 2041, given that MIDI will develop its own cement grinding set-up, it would be able to competitively cater to clinkers for Chittagong & Cox's Bazar region, which is considered as ~20% of total Bangladesh demand. Similar rationale is used for aggregates and stone.
- Scrap - A large captive steel industry is proposed at MIDI EZs. Also, basis discussions with private steel makers in Chittagong, Chittagong based plants will also benefit from Matarbari port since it can reduce their logistics costs by 16-18%. Hence, MIDI will be able to cater to ~50% of total country's traffic.
- Other bulk / break-bulk – MIDI can capture all intrinsic demand for Chittagong & Cox's bazar region (~20% of country's demand) and ~25% of demand for rest of the country, due to logistics cost saving benefits. Hence ~40% of total demand is assumed.

Exhibit 32: Addressable bulk and break-bulk traffic at Matarbari Port

Traffic at Matarbari	Addressable - 2041 (% of total traffic)	2030 IMF	2030 IEPMP	2041 IMF	2041 IEPMP
Bulk		**38.4**	**41.5**	**64.2**	**76.9**
Food grains	40%	2.2	2.2	2.3	2.3
Cement clinker	20%	13.6	15.9	26.7	36.2
Coal	3 GW power + another captive	6.0	6.0	7.0	7.0
Scrap	50%	2.4	2.7	4.4	5.8
Stone / crushed stone	20%	2.9	3.3	5.4	7.1
Other bulk commodities	40%	11.3	11.3	18.5	18.5
Break bulk		**2.1**	**2.2**	**2.5**	**2.7**
Fertilizer	40%	0.7	0.7	0.7	0.7
Salt	40%	0.2	0.2	0.2	0.2
Sugar	40%	1.0	1.0	1.0	1.0
All export – break bulk	40%	0.3	0.4	0.6	0.8
Total		**39-41**	**43-45**	**66-68**	**78-80**

Actual traffic at Matarbari – It is expected that traffic would gradually ramp up from ~15% of addressable traffic (in starting year 2027, when Phase 1 / Stage 1 is operational) to 100% of addressable traffic in 10th year of operations. Further, Scenario 1 for Bangladesh container traffic (2041 – ~266 MTPA and 2030 - ~156 MTPA) has been assumed as the more likely scenario for final traffic considerations.

Expected traffic for MIDI:
- **2031 – ~16-17 MTPA**
- **2041 – ~66-68 MTPA**

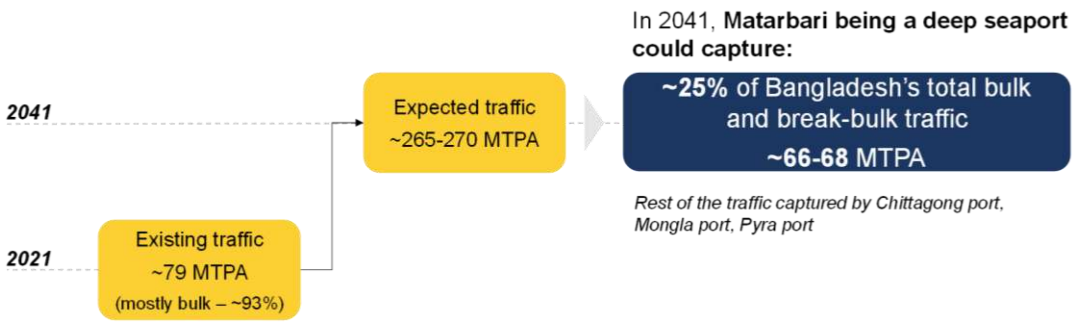
MIDI can capture ~25% of Bangladesh's bulk / break-bulk traffic by 2041.

Exhibit 33: Actual bulk and break-bulk traffic at Matarbari Port

Traffic at Matarbari	2030	2041
Bulk	**15.7**	**64.2**
Food grains	0.7	2.3
Cement clinker	4.1	26.7
Coal	6.0	7.0
Scrap	0.7	4.4
Stone / crushed stone	0.9	5.4
Other bulk commodities	3.4	18.5
Break bulk	**0.6**	**2.5**
Fertilizer	0.2	0.7
Salt	0.1	0.2
Sugar	0.3	1.0

Traffic at Matarbari		2030	2041
	All export – break bulk	0.1	0.6
Total		**16-17**	**66-68**

Exhibit 34: Bulk and break-bulk traffic projections at Matarbari Port



5.3.3. Liquid cargo projections

Apart from container and bulk and break-bulk traffic, Matarbari will also cater to the following liquid traffic by FY41 (detailed in the energy section)

- POL imports – 15-20 MTPA
- LNG imports – ~2000 mmcfd
- LPG imports – ~2 MTPA

5.4. Competitive levers

On back of its cost and time competitiveness, MIDI can become a prominent port for Bangladesh and Bay of Bengal ecosystem. However, port will have to be designed with all competitiveness levers in place for it to realize its full potential.

- **100% mechanized handling** for quick loading and unloading of vessels, by means of:
  - RTG / RMG cranes for containers
  - Mobile harbour cranes for bulk cargo
  - Conveyor system for bulk cargo
- **Adequate warehousing / storage facilities**, across commodities, reflecting local market trends in waiting times in taking delivery and expected traffic growth patterns. In the form of:
  - Container storage yards, including adequate reefer yards
  - Stuffing / destuffing / customs clearance areas
  - Open and protected storage yards for bulk goods
  - Specialized storage systems, - e.g., grain silos, LNG storage, tank farms, etc.
- **Road connectivity** – Currently, MIDI has only a 2-lane road access planned. The sufficiency would need to be studied considering revised traffic projections. Further, NI1 4-lane widening may be needed in long-term for better hinterland connectivity.
- **Rail connectivity** – This will be critical for unlocking evacuation capacity
  - Minimum double line till Dhaka
  - Dedicated sidings for bulk and container handling
  - Compatible with container movement by rail – single / double-stacked
- **Logistics infrastructure** (e.g., container freight stations around MIDI to absorb traffic from the ports

5.4.1. Matarbari port ramp up plan

The current sufficiency of the current port plan needs to be tested against the projected port traffic at Matarbari. The table below highlights the details of the same for container and bulk traffic.

Exhibit 35: Infrastructure sufficiency assessment - MIDI's Port Plans

Container	Phase 1 / Stage 1 2027	Phase 2 / Stage 1 2030	Stage 2 2041
As per current port plan			
Number of berths as per current plan[45]	1	1+3	1+3+3
Cumulative length	460 m	460m + 350m x 3 = 1,510 m	460m + 350m x 3 + 350m x 3 = 2,560 m
Cumulative capacity[46]	~0.9 Mn TEUs	3.1 Mn TEUs	5.3 Mn TEUs
Projected traffic	-	1-1.1 Mn TEUs	4.4-5.2 Mn TEUs
Comments	-	Planned capacity will be adequate to handle projected traffic – provided there is provision of 100% mechanized handling equipment at berth (1 RMG crane per 80 m)	Planned capacity will be adequate to handle projected traffic – provided there is provision of 100% mechanized handling equipment at berth (1 RMG crane per 80 m)

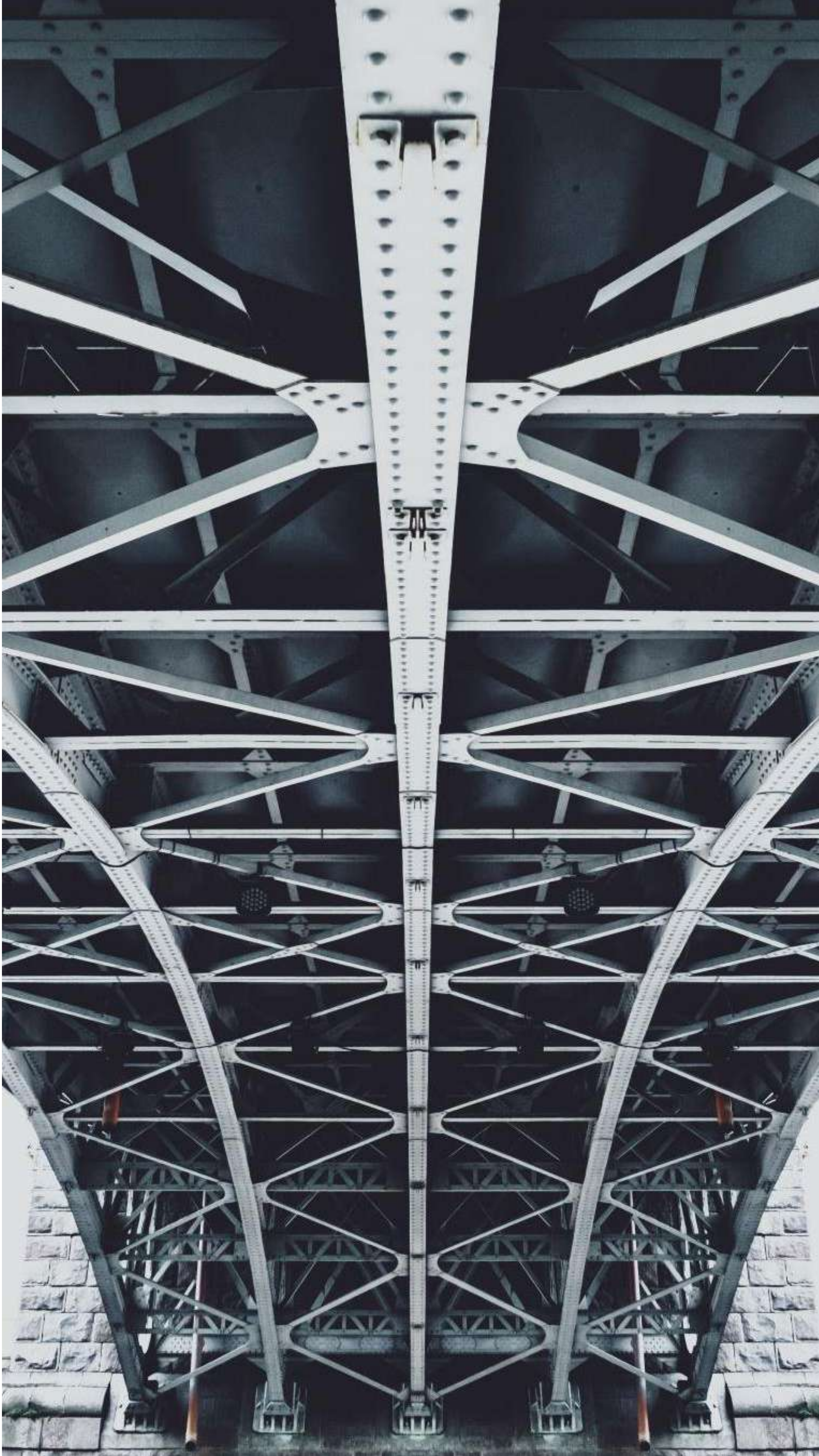
Bulk and Breakbulk	Phase 1 / Stage 1 2027	Phase 2 / Stage 1 2030	Stage 2 2041
As per current port plan			
Number of berths as per current plan[47]	1 (multi-purpose)	1 (multi-purpose) + 3 (coal)	1 (multi-purpose) + 3 (coal) + 4 (multi-purpose)
Cumulative length	300m	300m + 300 m x 3 = 1200 m	300m + 300 m x 3 + 300 m x 4 = 2,400 m
Cumulative capacity[48]	~7 MTPA	28 MTPA	56 MTPA
Projected traffic	-	16-17 MTPA	66-68 MTPA
Comments	Coal berths developed as part of Phase 1 coal power plant not included here. It is assumed that these berths will be sufficient to cater to coal requirement for ~3 GW coal power plants.	Captive berth at Matarbari Phase I Coal Power Plant has a capacity of ~7.5 MTPA and can easily cater to 1.8 GW coal-based power generation requirements. Hence, berths may	1-2 additional berth may be required to handle projected traffic. Or offshore handling facilities may be considered at anchorage point(s)

[45] Excluding feeder berths
[46] 1 RTG per 80 m; 30 TEUs moved per hour; 70% berth utilization
[47] Excluding feeder berths
[48] 2 harbor cranes per berth with a combined capacity of 26-30,000 T / day; 70% berth utilization

Bulk and Breakbulk	Phase 1 / Stage 1 2027	Phase 2 / Stage 1 2030	Stage 2 2041
		be reprogrammed from coal berths to general / multipurpose berths. Planned capacity will be adequate to handle projected traffic.	Captive berth at Matarbari Phase I Coal Power Plant has a capacity of ~7.5 MTPA and can easily cater to 1.8 GW coal-based power generation requirements. Hence, berths may be reprogrammed from coal berths to general / multipurpose berths. Further, adequate bulk handling cranes will also be needed to ensure cargo handling capacity.

Note - As per projects list received from JICA, Stage I Phase I was slated for 2024, Stage I Phase II for 2028 and Stage II for 2035. As per interactions with project coordinator – MIDI, Stage I Phase I will now be completed by 2027. Accounting for this delay – completion for Stage I Phase II has been moved to 2030, while Stage II completion has been kept at 2035

Pillar 2: Manufacturing Hub



Key Takeaways

MIDI's competitiveness in manufacturing accrues from its port-proximate ecosystem.

- **Logistics cost competitiveness with deep-sea port**
  25-35% shipping cost competitive for bulk and containerised goods; time savings for EXIM industries, with dedicated bulk and container infrastructure

- **Availability of captive power and gas feedstock**
  10+GW power generation within MIDI; import of LNG, coal & oil feedstocks

- **Possibility of large-scale industries for economies of scale**
  >8,000 acres across EZs

At the same time, MIDI also has some constraints as compared to established ecosystems in Bangladesh.

- **Distance from established consumptions centres like Dhaka**
  This might make MIDI less competitive for consumption driven industries like FMCG, which prefer to be closer to urban centres

- **Availability of skilled / semi-skilled labour**
  MIDI may not be competitive today for sectors like RMG, pharma, leather, which need skilled labour

Considering these aspects, MIDI's manufacturing hub will evolve over next 15-20 years to take increasing role in Bangladesh's economy.

In near-term, MIDI can target bulk / material industry and be a large supply hub for Bangladesh.

Bulk / material industries, where Bangladesh is import-dependent for raw materials (steel, cement, sugar refining) can benefit from port-proximity and easily attracted to MIDI.

MIDI can pass-on scale benefits and lower logistics costs, thereby reducing cost of bulk goods produced in Bangladesh.

In the near to mid-term, MIDI can also be a game-changer in select sectors by capturing upstream and downstream value-add opportunities within Bangladesh.
MIDI's competitiveness can translate into domestic value-add opportunities in sectors like petrochemicals & polymers, edible oil, which are currently import-dependent for finished goods. MIDI offers possibilities of integrating most of value chain at single location (e.g. POL refinery to derivatives to polymer production). This can provide an economical domestic alternative (up to 25% against import costs) to import of such products (chemicals, plastic feedstock, soya oil), while also contributing to country's GDP.

In the long-term, MIDI may also attract export-oriented and domestic discrete manufacturing in select segments like consumer durables, pharma, plastics etc.

But prospects of export-processing are contingent upon various factors including development of a compelling industrial & urban ecosystem at MIDI (which can attract talent pool) and Bangladesh's overall export competitiveness.

6. Pillar 2: Manufacturing Hub

6.1. MIDI's Competitiveness

MIDI's port-linkages make it an ideal location as a hub for import-linked manufacturing in Bangladesh.

MIDI's competitive advantage accrues from the following:

- Large volumes of industrial commodities will be traded via Matarbari port, providing ready feedstock for manufacturing
- Logistics cost competitiveness due to presence of deep-sea port
- Availability of captive power, coal and gas feedstock
- Possibility of large-scale industrial set-up for economies of scale
- Greenfield, planned industrial ecosystem with state-of-the-art utilities, infrastructure, warehousing & logistics infra
- Strong hinterland connectivity with planned road and rail trunk infrastructure

In some areas, MIDI may not be as competitive as other industrial hubs in Bangladesh:

- Availability of skilled talent pool will be a challenge until MIDI evolves into an urban ecosystem which can attract such talent from existing urban centres like Dhaka
- Consumption driven and cost sensitive industries like FMCG, cement etc. prefer to be around demand centres and hence may not shift to MIDI in short-to-midterm.

For these industries, existing and upcoming industrial hubs like Narayanganj, Barishal, Chittagong, BSMSN may be more competitive due to their proximity to consumption centres of Dhaka and Chittagong.

6.2. Sector selection

Domestic manufacturing

To identify the sectors suitable for manufacturing at MIDI – an analysis was conducted on long list of industries capturing >90% of manufacturing GDP, imports and exports of Bangladesh.

Step 1 – Preparation of long-list of sectors basis PP-2041, Bangladesh Industrial Policy (2019), industries in other BEZA estates and global benchmarks

Step 2 – Shortlisting metrics
Shortlisting of sectors was done basis rating on select parameters (EXIM dependence, port proximity, etc.)

Step 3 – Hypothesis testing with private sector and sector deep dives

Further, a final list was arrived by testing of initial hypothesis of shortlisted sectors with major private sector and experts.

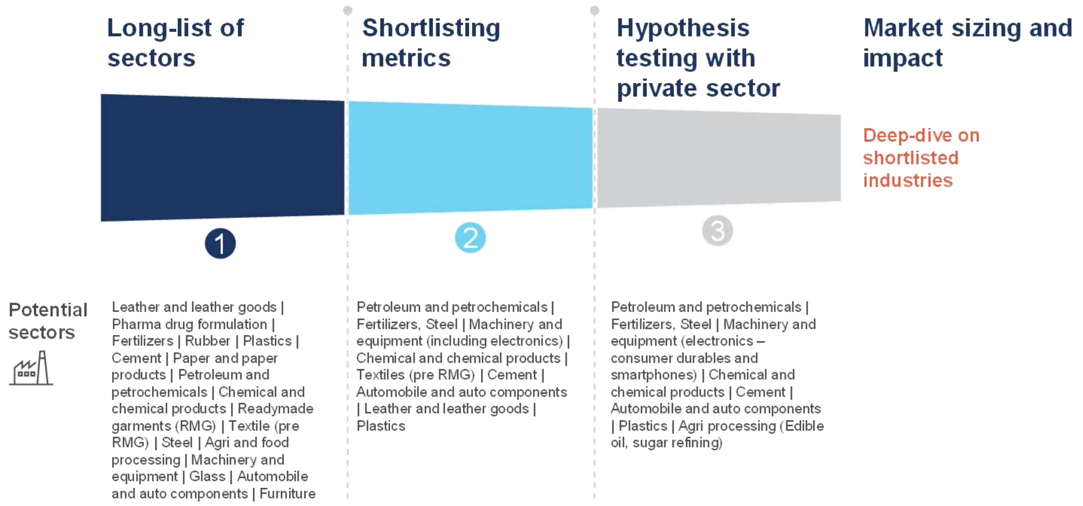
Final list of shortlisted industries for further study:

- Petroleum and petrochemicals
- Plastics
- Steel
- Cement
- Agro and food processing – edible oil, sugar refining, salt refining
- Fertilizers
- Chemicals
- Automobile and auto components
- Electronics, consumer durables and smartphones

For the above shortlisted 9 sectors, an in-depth industry assessment was undertaken to identify the target capacity and size for industry at MIDI.

The detailed industry selection approach is enclosed as annexure.

Exhibit 36: Sector selection framework for manufacturing at MIDI in short-term



Sector Selection - Exports

The sector selection approach followed to identify suitable sectors for exports-diversification at MIDI is as below:

Step 1 - Long-list of sectors
A preliminary long list of sectors was prepared basis focus exports sectors highlighted in Perspective Plan of Bangladesh (2021-2041), National Industrial Policy (2019) and case benchmarks of global port-led industrial hubs.

Step 2 - Shortlisting of sectors basis labour competitiveness
The sectors were further filtered basis the comparative labour intensity – which provides an inherent export competitiveness to Bangladesh.

Step 3 - Shortlisting of sectors basis competitive advantages of MIDI
The final shortlisting of sectors was based on fitment of sectors to MIDI's endowments – logistics and energy intensity.

Thus, the final list of shortlisted sectors for export diversification for MIDI include

- pharmaceuticals & API
- synthetic fibres
- shipbuilding
- plastic products, etc.

The detailed industry selection approach is enclosed as annexure

6.3. Manufacturing Strategy

Post selection and deep dive into all sectors, the following manufacturing strategy was formulated for MIDI

MIDI's manufacturing strategy will be 3-fold.

Strategy 1: Attract bulk / material industries and become a supply hub for Bangladesh

MIDI can be a hub for bulk and heavy import dependent manufacturing industries in short-medium term. In these industries, MIDI can provide reduced logistics costs and economies of scale benefits.

Example of these sectors are steel and cement. Considering that these sectors have deep synergies with MIDI, these can be attracted in short-term.

Strategy 2: Create manufacturing value-add opportunities for Bangladesh

The ecosystem at MIDI can offer cost benefits in creating new manufacturing value chains / capturing upstream & downstream segments of value chains in Bangladesh.

Example of such sectors will be Petrochemicals and Polymers, Chemicals and Fertilizers, Soyabean Crushing and Sugar & Salt Refining.

Strategy 3: Diversify into export-oriented / discrete manufacturing in mid to long-term

Once established as a manufacturing hub, MIDI can focus on developing ecosystem for attracting talent pool required to set-up discrete manufacturing. Also, export-focused industries depending on Bangladesh's export competitiveness can come up at MIDI. Hence, this can be mid to long-term strategy.

Sectors suitable for this strategy are artificial textiles, automobile assembly, consumer durables, pharmaceuticals.

One deep dive from each of the strategy buckets has been explained in the following sections. Deep dives for all other selected industries are attached as annexure.

Strategy 1	Strategy 2	Strategy 3
Attract bulk / material industries to become a large supply hub	**Create higher value add in material industries for Bangladesh**	**Diversify to export-focused value-addition**
• Steel • Cement • Sugar refining	• Downstream petrochemicals and Polymers • Chemicals • Fertilizer • Soyabean crushing & extraction	• Automobile assembly • Consumer durables • Plastic products • Artificial Textiles • Pharmaceuticals • Small ship-building
Immediate focus	*Immediate focus; diversify into downstream activities eventually*	*Mid-long-term focus*

6.4. Deep-dive - Long steel manufacturing

Domestic demand of steel in the country is estimated to be ~8.5 MTPA (2020-21). Long-steel is domestically manufactured from scrap. Flat steel, manufactured at blast furnace steel plants, is imported.

The table below outlines the demand-supply scenario of finished steel products in Bangladesh.

Demand – finished products	
Market Size (Volume)	~8.5
Flat steel	*~2.4*
Long steel	*~5.3*
Finished products	*~0.8*
Supply – finished products	
Domestic production - long steel	~5.3
Import – flat steel[49] *[HSC: 7208, 7210, others]*	~2.4
Import - finished products[1] *[HSC: 7304, 7308, 7213, others]*	~0.8

All values are in MTPA (for 2020-21)

Installed capacity

The total installed steel manufacturing capacity in Bangladesh is 8.5-9 MTPA. The market is consolidated with top 4 players contributing to ~60-65% of installed capacity based in Chittagong, located around the existing ship-breaking yard and port. Some of the key players are:

Key players	Capacity
BSRM Group	~2.0
Abul Khair Steel (AKS)	~1.8-2.0
Kabir Steel Rolling Mill (KSRM)	~0.8
GPH Ispat Limited	~0.8

All values are in MTPA

Raw materials

Scrap steel for long steel manufacturing is imported from USA, Europe and Japan. Further, some of scrap steel is also procured from ship-breaking yard at Chittagong.

Raw material imports	**~4.3**
Including scrap steel, ingots (minor sponge)	
Ferrous waste & scrap, iron ingots *[HSC: 7204]*	~3.7
Iron ore and other spongy ferrous products *[HSC: 7203]*	~0.5
Others	~0.1
Scrap iron from Chittagong ship-breaking yard	**~2.0**

All values are in MTPA

Future demand estimation

Steel demand projection is done basis IEPMP in-between scenario at 7.8% p.a. Steel elasticity to GDP is taken as 1, basis benchmarks of similar developing countries. Demand estimation for 2030[50] and 2041 is presented below.

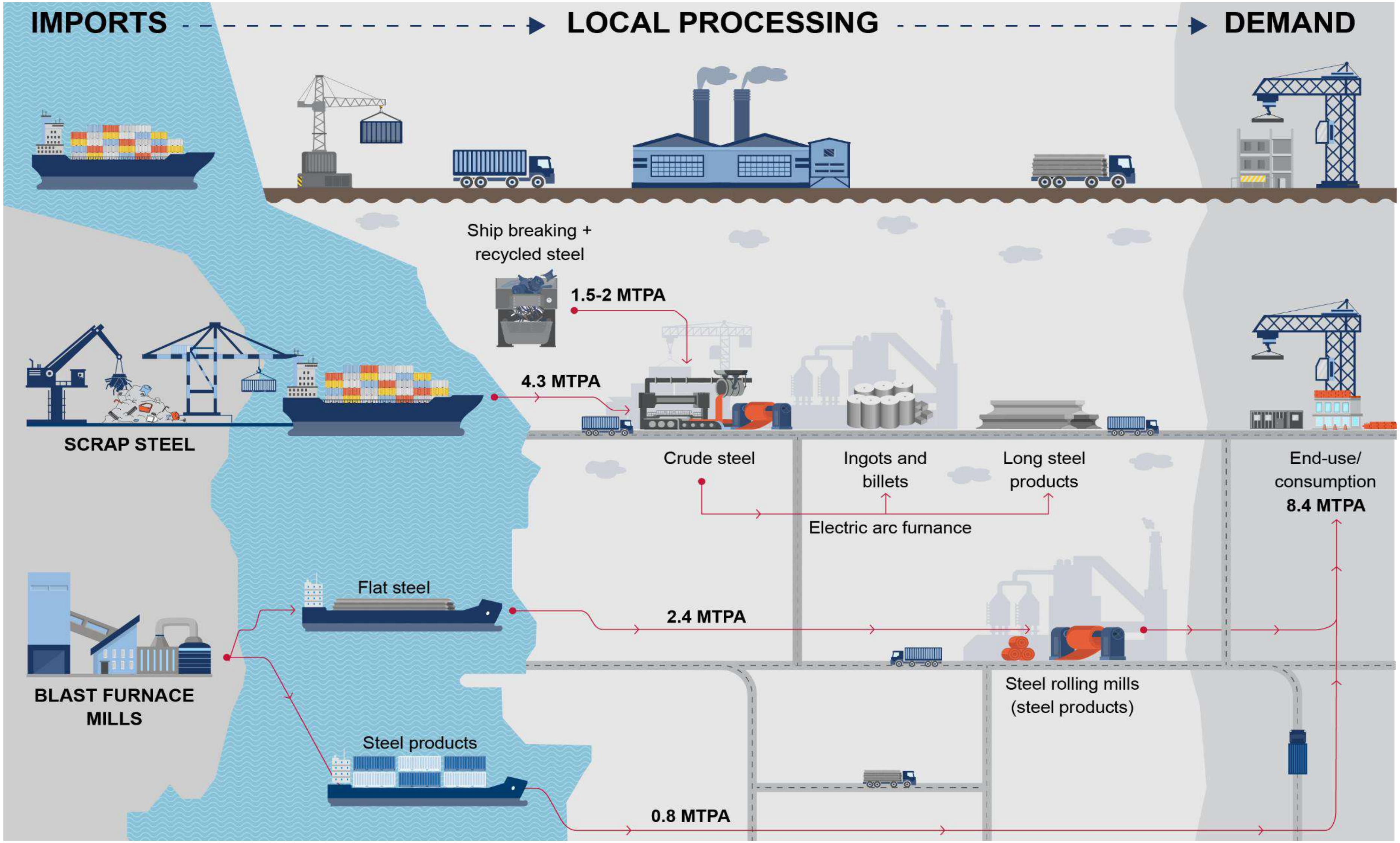
Exhibit 37: Future demand estimation for steel industry in Bangladesh

	2021	2030	2041
Steel Demand	**8.5**	**18.0**	**38.2**
Long steel products (raw material)	5.3	11.2	23.8
Finished products	0.8	1.7	3.6
Flat steel products	2.4	5.1	10.8
Domestic Manufacturing Potential (1)	**5.3**	**12.9**	**27.4**
Long steel	5.3	11.2	23.8
Finished products (100% domestic FY31onwards)	-	1.7	3.6
Flat steel products[51]	-	-	-
Existing capacity incl. visible capacity		**13.0**	**13.0**
Production from existing capacity[52] (2)		**9.8**	**9.8**
Manufacturing gap (3 = 1-2)		**3.2**	**17.6**
Manufacturing capacity needed[53]		**4.2**	**23.5**
Raw materials needed for Bangladesh's demand[54]	6.4	15.5	32.9
Out of which, raw material demand met via Chittagong shipbreaking[55]	2.0	3.0	3.0

All values are in MTPA

[49] Import of finished products mainly from US, Japan and UK
[50] 2030 refers to the FY31 i.e. period spanning July 1, 2030 to June 30, 2031
[51] Flat steel requires blast furnace iron for production. Since all steel mills in Bangladesh use scrap steel, it is assumed that flat steel will continue to be imported. The same has been verified in interaction with BSRM.
[52] Assuming 70% production efficiency
[53] Assuming 70% production efficiency
[54] 1.2 times manufacturing capacity
[55] Theoretical capacity at Ship-breaking facility, as per discussions with BSRM

Exhibit 38: Value chain of steel industry in Bangladesh



Cost competitiveness of scrap import and steel manufacturing at MIDI

MIDI, with a large deep seaport, is expected to be cost-competitive in steel manufacturing, as against existing Chittagong ecosystem, with **USD 40-45 / ton of production cost savings (4.5-5.5% cost of finished product),** as result of the following:

- **Logistics cost savings (USD 20-21 /ton**[56]**)** due to larger ships and carriers and elimination of trans-shipment at Colombo / Singapore
- **Power cost savings (USD 13-14 /ton)** by use of captive power at MIDI.[57]
- **Scale benefits of larger unit at MIDI (USD 13-14 /ton)** due to larger plants of 4-5 MTPA[58].
- Minor **extra costs for transporting long-steel to Dhaka** (USD 6-7 /ton additional costs)

Overall, estimated cost of manufacturing at MIDI is expected to be USD ~800-810 /ton vs USD ~840-850 / ton at Chittagong**.**

This gives MIDI advantage over domestic market, which is currently pegged at USD ~900 /ton for long steel in Dhaka.

Opportunity at MIDI

Steel manufacturing from scrap is expected to continue to be a dominant part of Bangladesh's local production. Owing to the existing steel ecosystem, proximity to Dhaka and vicinity to ship breaking cluster, Chittagong ecosystem will continue to play an important role in meeting the steel demand of the country.

MIDI can supplement Chittagong's production and become another large steel cluster due to logistics cost and scale efficiencies.

To support this vision, manufacturing capacity target for MIDI has been taken at 10-12 MTPA (across 2-3 units).

This would imply:

- Land requirement – 1,200-1,400 acres
- Power requirement – ~1 GW
- Employment generation – ~21,000-22,000 jobs

With capacity of 10-12 MTPA, MIDI can capture, ~50% Steel capacity gap in 2041, which translates to ~30% total steel demand of Bangladesh in 2041.

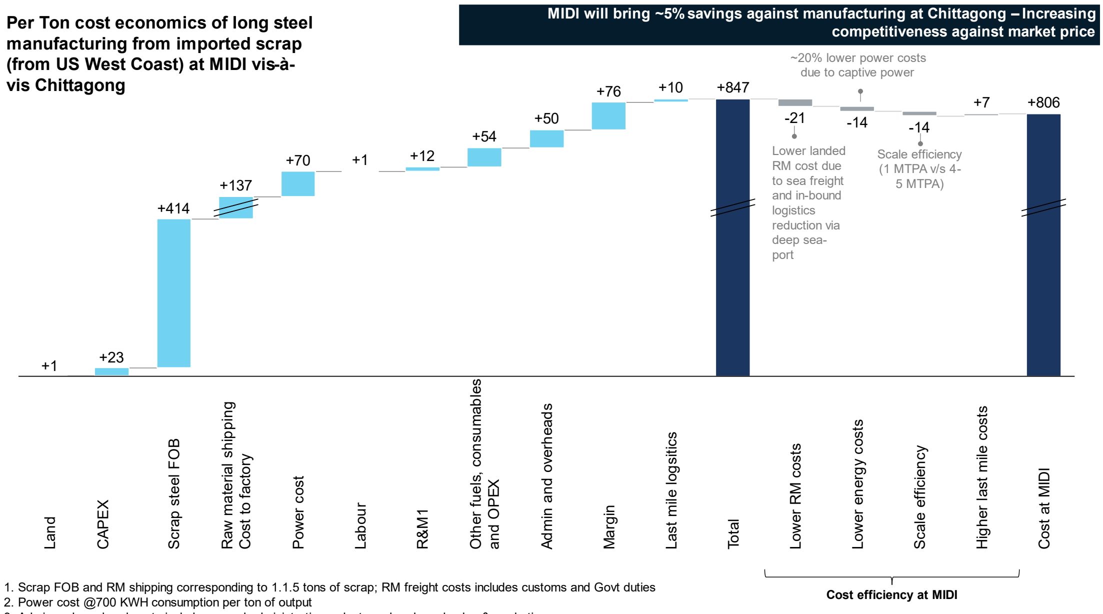
Exhibit 39: Competitiveness of long steel manufacturing at MIDI

All values in USD / ton	Current (~1 MTPA Chittagong)	Proposed Plants at MIDI (4-5 MTPA)
Landed cost of RM per ton output	**551**	**531**
Scrap steel FOB Price[59]	360	360
Customs and import duty	20	20
Sea freight and inland logistics[60]	100	81
Input factor	*1.15*	*1.15*
Fixed + variable operating costs[61]	**210**	**187**
Margins (@10%)	**76**	**72**
Logistics to Dhaka	**10**	**17**

[56] Shipment from USA West Coast
[57] Total ~700 kwh of power requirement per ton of long steel; average power tariff for industrial usage – Taka 10/ unit (basis interaction with BSRM and private players) | Avg LCOE of coal & LNG plants with margins at MIDI – Taka 8 / unit
[58] Resulting from lower CAPEX, R&M, admin costs and overheads, etc.

[59] Scrap steel US FOB price
[60] Includes CIF + shipping + port charges and inland logistics up to factory
[61] Includes all fixed (CAPEX / depreciation, land lease, R&M, fixed OPEX, admin and overheads, etc.) and variable costs (power, labor, fuel, consumables, etc.) - verified basis in house experts and discussion with private players in Bangladesh

All values in USD / ton	Current (~1 MTPA Chittagong)	Proposed Plants at MIDI (4-5 MTPA)
Landed price at consumption centres	**840-850**	**800-810**



1. Scrap FOB and RM shipping corresponding to 1.1.5 tons of scrap; RM freight costs includes customs and Govt duties
2. Power cost @700 KWH consumption per ton of output
3. Admin and overhead costs include general administration , plant overheads and sales & marketing
4.. 10% margin basis benchmarks

6.4.1. Road map - Long steel manufacturing at MIDI

Table below provides roadmap for set-up of long steel manufacturing at MIDI starting from crude steel and billet manufacturing in short term and moving to integrated long steel products plants in medium-long term.

Parameters	2030	2035[62]	2041
Capacity (MTPA)	1-2 green field units to come up at MIDI; Low starting capacity expandable up to 4-5 MTPA each	Expansion of existing facilities + setup of new greenfield unit(s)	2-3 facilities at MIDI with combined capacity of ~12 MTPA
	1.5-2.5	6-7	10-12
Products / value chain	Billet production to cater to national demand + in-house long steel processing	Large scale integrated crude steel cum downstream long steel rolling plants	
Enablers	1. Fully operational mechanized bulk and container berths (phase I) to handle scrap steel imports 2. Well-developed hinterland connectivity - fully operational port access road	1. MIDI being established as an industrial hub - increasing steel products demand in the catchment 2. Well-developed hinterland connectivity - road + rail both to cater to large outbound manufacturing traffic	1. Reliable and secure power supply; requirement of ~1GW for 12 MTPA facility 2. Adequate residential and social infra to cater to ~21,000 workers

[62] 2035 refers to the FY36 i.e. period spanning July 1, 2035 to June 30, 2036

Parameters	2030	2035[62]	2041
Cumulative Investment required (USD Mn, 2022 prices)	650-750	2,400-2,600	4,200-4,500
Target investors	Replication of existing EAF technology. Large domestic players best suited to expand capacities. Potential target investors - BSRM, AKS, etc.	Large domestic players - BSRM, AKS, etc. Other large Bangladesh conglomerates looking to diversify into heavy industries - Bashundhara, Meghna, etc.	

6.5. Deep-dive – Petrochemicals & polymers

Petrochemicals and its derivatives (including polymers) constitute ~40% share of the global chemicals market. The petrochemical industry has several upstream and downstream linkages. These include upstream linkages with petroleum refining, natural gas processing and downstream linkages with multiple end use industries. Hence, the presence of an integrated petrochemical ecosystem has the potential to invigorate local economy and generate widespread employment.

The proposed 10 MTPA refinery(ies) at MIDI, provides an opportunity for integration with petrochemical cracking and opens the region to development of large-scale downstream industries. Potential downstream opportunities include, but are not limited to, polymers and plastics, synthetic fibers, primary petrochemicals and their further processing into chemicals / chemical products including paints, solvents, pharmaceuticals, dyes and pigments, etc. This section elaborates on these synergies and explores MIDI's potential to house downstream units.

6.5.1. Integration of Refinery with Petrochemical Units

There exist multiple synergies and value drivers for integration of refineries with petrochemical units.

Key integration synergies

Feedstock and by-product synergies

- Refinery "off gases" act as feedstock to steam cracker
- Refinery's naphtha output acts as feedstock to steam cracker
- High purity hydrogen from cracker can be used in refinery
- Excess steam from cracker can be used for captive power generation

Other synergies

- Common utility centres
- Common jetty and storage infra
- Shared technical and support functions.

Benefits of integration

Integrated sites have lower costs and better financial returns than standalone units:

- 10-15% lower energy costs
- 15-20% lower cash OPEX
- 10-15% lower personnel cost
- ~30-35% higher RoI
- 5-10% higher utilization

As a result, for a >200KBPD refinery and 1 MTPA cracker, integration can generate savings of USD 50 Mn from fixed cost reduction and USD 150 Mn from variable cost reduction.

Integration in practice

Currently ~35-40% of the refineries have some form of downstream chemicals integration. However, to optimize costs and secure higher margins, a lot of refineries are now integrating with petrochemical units.

- All global oil majors have downstream petchem. integration
- All ExxonMobil liquid crackers globally are integrated with refineries
- There are ~14 ongoing refinery integration projects in China

The case study of Shell Eastern Petrochemical Complex project in Singapore project is presented below. **Petrochemical integration led to margin uplift of ~USD 10 /bbl for the earlier standalone petrochemical refinery/**

Exhibit 40: Synergies by refinery integration

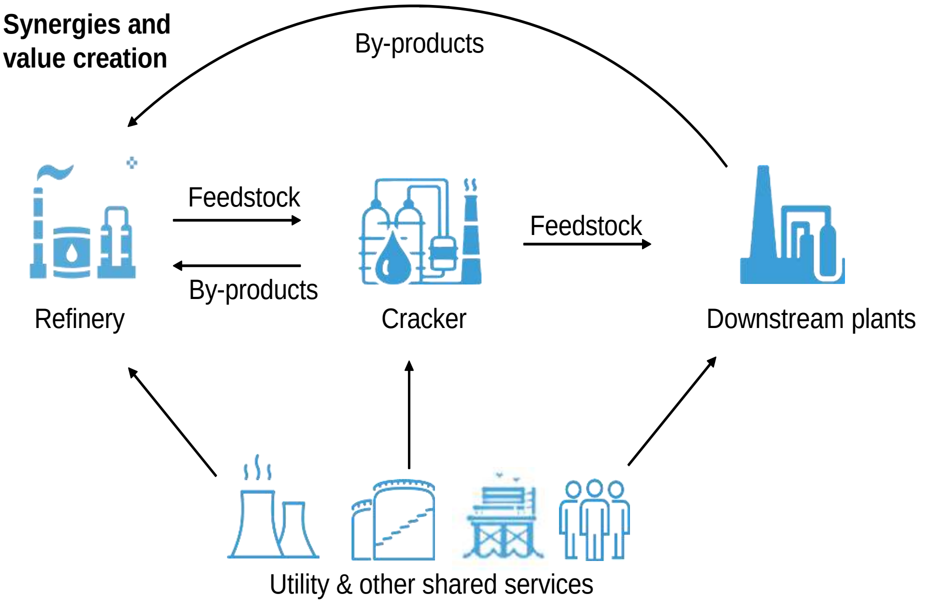


Exhibit 41: Shell Bukom Case Study

Case Study: Shell Bukom transitioned from a standalone refinery to an integrated refinery-petchem complex in 2010

Configuration

- **Bukom refinery:** 500kbpd, Shell's largest wholly-owned refinery globally
- **Petchem (SEPC):** Ethylene cracker 1 MTPA and downstream MEG plant 750 KTA

Feedstock:

- **Fully integrated**
- **Flexible feed** (LPG, naphtha, GO, hydrowax) from refinery
- Steam and H2 from cracker is fed back into refinery

History:

- Bukom refinery started >50 years ago. SEPC started much later and was completed in 2010.
- Bukom refinery was **modified** in order to produce feedstock for SEPC's ethylene cracker complex (ECC)
- This integration delivered **operating efficiencies** and **valuable by-products**. SEPC is able to use feedstock from the adjacent refinery rather than importing from elsewhere.

As demonstrated, refinery petrochemical integration can lead to higher margins and create cost and revenue synergies.

Further, given a wide array of end uses, petrochemical complex can foster large number of downstream industries.

Given Bangladesh's reliance on imports for petrochemicals and polymers, petrochemical integration makes imminent sense to ensure local value-added manufacturing and move towards self-sufficiency while reducing import dependency resulting in BoP savings.

- **Ethylene based imports (C2 petrochemicals) into Bangladesh totalled ~0.4 MTPA in FY21 with an import value of ~USD 0.5 Bn**
- **Propylene based imports (C3 petrochemicals) into Bangladesh totalled ~0.5 MTPA in FY21 with an import value of >USD 0.5 Bn**

The next section deep dives into polymers manufacturing to examine the demand-supply scenario and competitiveness of manufacturing at MIDI.

6.5.2. Plastic Polymers

Demand-supply scenario

The annual demand of plastics in Bangladesh is estimated to be ~1-1.1 MTPA (2020). The installed capacity for finished plastics products in the country caters to ~80% of its demand and remaining demand is met via imports. However, Bangladesh's plastics manufacturing industry is heavily dependent on imported raw material such as polymers or plastic resins. The table below outlines the demand-supply scenario of plastics (both raw material and finished products).

Demand analysis	
Market Size (Volume)	~1.0-1.1
Supply analysis	
Locally manufactured finished products	~0.8-0.9
Production using raw material sourced via domestic recycling	~0.2-0.3
Production using raw material sourced via imports [HS 3901-3915]	~0.5-0.6
Imported finished products *[HS 3916-3926]*	~0.2

All values are in MTPA

Value-chain and constitution

The value-chain of plastics industry in Bangladesh's context can be divided into three parts as below.

- **Production of plastics from plastic resins**
  - Base of plastics is polymers / plastic resins, which are put through moulding process to attain various shapes
  - 50,000+ companies in Bangladesh are engaged in plastic products production – 98% of the firms are MSMEs | 60% located around Dhaka - feed to pharma, RMG and FMCG cluster in Dhaka
  - Bangladesh also exports minor plastic products – direct exports of USD 100-150 Mn (India, Italy, Dubai) and deemed exports of USD 900 Mn (part of exported RMG / other products)
  - Plastic product industry is highly logistics sensitive and customized - typically catering to market within 200-300 km range
  - Also, the industry typically has MSME units and is labour intensive. For this reason, most plastic product manufacturing in Bangladesh is expected to remain concentrated around demand centres in Dhaka / Chittagong

- **Production of plastic resin (from monomers and polymers)**
  - Plastic resin are polymers of different types – including PVC, PET, HDPE, etc.
  - As discussed above, demand for raw material is ~0.8-0.9 MTPA, out of which 0.2-0.3 MTPA is sourced from recycling of used plastics
  - About 60% of plastic resins used in Bangladesh are
    - PVC[63] - Demand ~0.4 MTPA | local manufacturing

[63] PVC is used in the building and construction, health care, electronics, automobile sectors, in products ranging from piping and siding, blood bags and tubing, to wire and cable insulation, windshield system components and more. PET is used in fibers for clothing, containers for liquids and foods, and

~0.15 MTPA | Rest imported from Taiwan, China, Thailand, etc
  - PET - Demand ~0.2 MTPA | local manufacturing ~0.1 MTPA | Rest imported from Taiwan, China, Thailand, etc
  - Others – HDPE, LDPE, etc.
- The only large resin manufacturing unit in Bangladesh has recently been operationalized by Meghna Group in Narayanganj (1.5 L ton PVC resin + 1 L ton PET resin). The unit is dependent upon imported ethylene and chlorine for its PVC resin production.

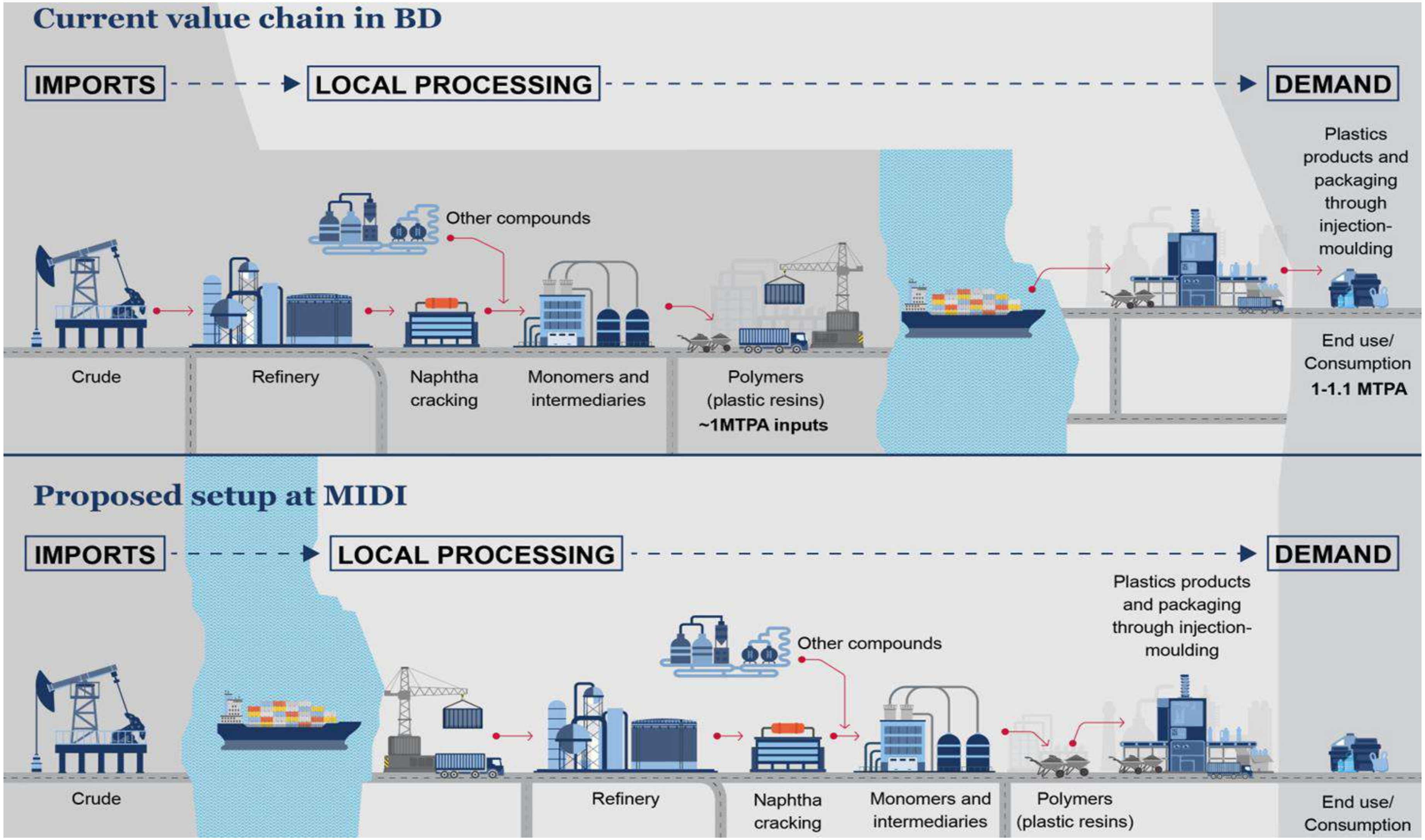
- **Production of base raw materials required for each type of resin**
  - Base raw materials for plastic resins are primarily ethylene and propylene which can be obtained from downstream cracking of Naphtha
  - These petrochemicals are then combined with other raw materials to produce plastic resins including PET, PVC, HDPE, etc.
  - TK group is setting up a refining cum petrochemical unit at MIDI, which will produce ethylene and propylene required for downstream resin production

Hence, with the coming up of refinery and its integration with downstream petrochemical unit, lot of primary petrochemicals including ethylene, propylene will be manufactured at MIDI. This will enable plastic resin manufacturing industries to come up in MIDI and supply resins to plastics products manufacturers located near key consumption centres of Dhaka and Chittagong.

The change in polymer and plastic ecosystem post establishment of 10 MTPA refinery(ies) at MIDI is illustrated in the exhibit below.

thermoforming for manufacturing, and in combination with glass fiber for engineering resins.

Exhibit 42: Value chain of plastics industry in Bangladesh and proposed set up at MIDI



A – Cost competitiveness of manufacturing at MIDI

Manufacturing of plastic polymers at MIDI

Ethylene is a primary petrochemical for manufacturing of wide range of plastic polymers including HDPE, PVC, etc.

The exhibit below presents cost comparison of manufacturing ethylene, HDPE, PVC at MIDI in the following scenarios:

- **Case 1** – direct imports
- **Case 2** – import of ethylene to produce plastic resins
- **Case 3** – import of naphtha for downstream cracking and production of ethylene, and plastic resins
- **Case 4** – integration of refinery and petrochemical cracker to supply essential ethylene for plastic resin manufacturing

As illustrated, manufacturing of plastic polymers is competitive viz-a-viz imports – in all cases.

Hence, while the steady **state refinery and petrochemical chemical integration may materialize in medium-long term, plastic resin / polymer manufacturing units can also be setup at MIDI in the short term. These may set up limited capacity and leverage deep seaport to import base petrochemicals and manufacture plastic resins. Capacity expansion may be undertaken basis easy and cheaper availability of feedstock from refinery at MIDI at a future date.**

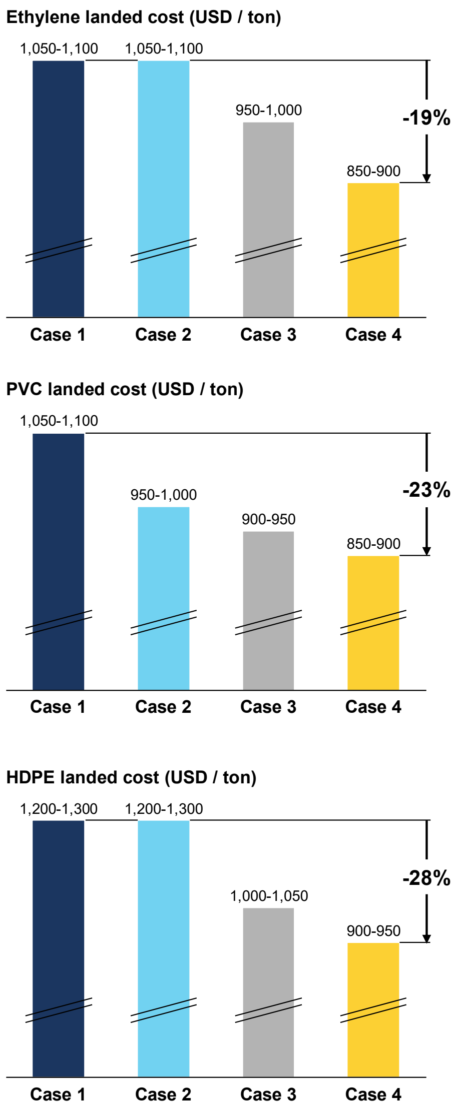
Manufacturing Plastics Products at MIDI

Plastics products manufacturing industries (bottles, packaging, pipes, filaments etc.) are typically located close to the consumption centres and end use industries – pharma, FMCG, RMG, etc. due to cost competitiveness and manpower availability.

Further, logistics cost of resins is lesser as against logistics cost of finished products to Dhaka, making it less competitive against local manufacturing around Dhaka / Chittagong.

- Transport cost of plastic resins to Dhaka: USD 16-17 per ton (@14-15t loading per truck)
- Transport cost of finished plastic products: USD 25-30 per ton (@ 8-10t loading per truck)

Exhibit 43: Cost competitiveness of Polymers



- **Case 1** – direct imports
- **Case 2** – import of ethylene
- **Case 3** – import of naphtha
- **Case 4** – integration of refinery and cracker

Note
Import prices include custom and VAT applicable on respective commodities
Landed cost of ethylene accounts for by-product credits (inc. C4 fraction, propylene, etc.)

Hence, it may be economically prudent to produce PVC resins at MIDI and transport them to Dhaka and adjoining areas for production of plastic / packaging products. However, MIDI can house smaller plastic products manufacturing units for captive demand of MIDI EZs.

B – Demand Estimation

Bangladesh's current per capita plastic consumption[64] is equivalent to ~6-7 kg p.a. which is quite low. Global shift of reduced/ no usage of single use plastic will also have an impact on the overall demand.

However, there is immense scope of growth in size of domestic consumption of plastics for the country backed up by growing population, increasing demand of synthetic fibres and use of plastic polymers in construction industry. Hence, the future demand estimation is done assuming the target per capita consumption for the country to increase to ~40 kg p.a. by 2041 – equivalent to Thailand / Malaysia today. The table below outlines the demand projection basis this assumption.

Exhibit 44: Future demand estimation for plastics industry in Bangladesh

	2021	2030	2041
Total demand[65]	**1.0**	**2.8**	**7.6**
Imports - finished products	0.2	0.6	1.5
Imports[66]	20%	20%	20%
Domestic production	**0.8**	**2.2**	**6.1**
Current capacity	0.8	0.8	0.8
Gap	**0.0**	**1.4**	**5.3**
Production through Recycled plastics[67]	**0.3**	**0.7**	**1.8**
	30%	30%	30%
Demand for resins + polymer	**0.5-0.6**	**1.9**	**5.1**

All values are in MTPA

C – Opportunity at MIDI

Industries at MIDI EZs can use mix of **imported / domestic refinery raw materials for production of plastic resins.**

Manufacturing capacity target for MIDI – ~1-1.5 MTPA

- Land requirement – 110-150 acres
- Employment generation – ~5,000

MIDI can capture 20-30% of the total market of plastic resins in Bangladesh by 2041.

64 Per capita consumption of plastics in India – 13 kg p.a. and US – 108 kg p.a.

65 Demand grown to meet the target plastic consumption level by 2041

66 Imports assumed to be restricted to 20% till 2041, given the rise in plastics manufacturing in the country

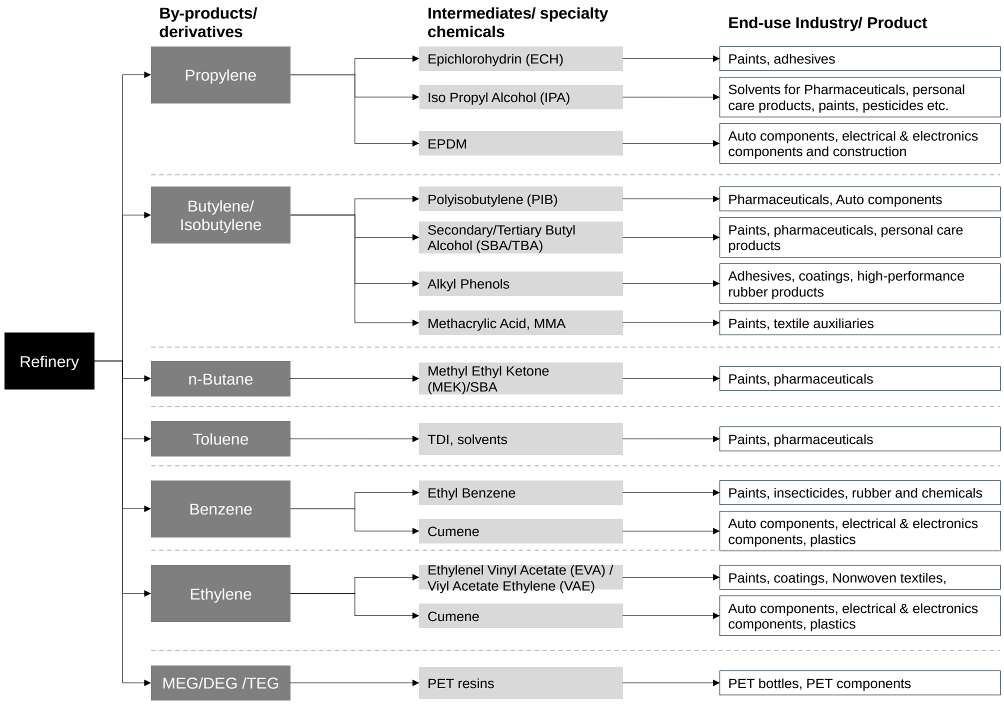
67 Existing level of use of recycled plastic - ~0.3 MTPA – 30% of total demand. It is assumed that use of recycled plastics will continue as a sustainability measure and will remain at ~30% of total plastics product manufacturing.

6.5.3. Chemical products manufacturing

Along with plastic polymers, refining cum petrochemical complex can provide opportunities for further processing these primary petrochemicals into end use chemicals / chemical products for various industries.

The exhibit below shows various by-products and derivatives of the refining cum petrochemical complex and potential intermediary chemicals and final products that can be manufactured using them as feedstock.

Exhibit 45: Refinery outputs



Potential example of one such industry (paints) is detailed in Annexure.

Opportunity for manufacturing of chemical products at MIDI

In case of establishment of upstream refining and petrochemical complex at MIDI, the region will be well suited to house downstream chemicals industry. The chemicals industry will benefit from domestically produced resins and other chemicals produced in upstream refining and petrochemical units.

Manufacturing capacity target for MIDI by 2041 – ~1 MTPA

- Land requirement – ~400-450 acres
- Power requirement – ~27-30 MW
- Employment generation – ~8,200-8,400
- Target industries – paints, synthetic fibres, etc.

6.5.4. Road map – Petrochemicals and polymers manufacturing at MIDI

Parameters	2030	2035	2041
Capacity (MTPA)	Greenfield capacity creation for polymers (plastics resins) and petrochemicals manufacturing	Brownfield expansion of existing units + additional green field units for final products manufacturing e.g. - plastic products to cater to inhouse demand of MIDI industries (food processing, packaging for discrete industries, etc.), paint and emulsion manufacturing plants, etc.	
	Polymers - 0.5 Petrochemicals and chemical products - 0.2	Polymers - 0.9-1.0 Petrochemicals and chemical products - 0.5-0.6	Polymers - 1.2-1.4 Petrochemicals and chemical products - 0.9-1.0
Products / value chain	Production of polymers and petrochemical products primarily from imported feedstock	Production of polymers and petrochemicals using feedstock from MIDI's in-house refining cum petrochemical complex. Further, processing of part of polymers and petrochemicals into end use products.	
Enablers	Development of refinery and downstream cracking unit cum petrochemical complex to provide essential feedstock for polymer and petrochemical industry		
Cumulative Investment required (USD Mn, 2022 prices)	950-1,000	1,900-2,000	3,000-3,200
Target investors	Domestic investors with existing presence in bulk / material industries and with good financial strength will be suited for this hub, Large conglomerates with diversified industrial presence in Bangladesh can look at integrated presence across the value chain from refining to petrochemicals and to polymer / chemical manufacturing, to get maximum margins. Companies with existing presence in plastics or chemicals industry may also look at expansion to upstream polymer manufacturing at MIDI. Currently only Meghna Group has started with plastic resin manufacturing in Bangladesh. Other large domestic conglomerates with captive domestic demand may be suited. Further, TK group and S Alam Group have shown interest in setting up petrochemical complex at MIDI – with TK Group initiating site work at the land allotted by BEZA. This shows interest of industry in potential of petrochemicals and polymers industry at MIDI.		

6.6. Perspective on exports

Before diving into an illustrative example of export-oriented manufacturing industry, this section provides a perspective on Bangladesh's export scenario.

Bangladesh's exports grew from USD 38 Bn in FY21 to USD 52 Bn in FY22. However, exports from Bangladesh are highly skewed with RMG constituting ~80% of all of Bangladesh's exports. Success of Bangladesh's RMG exports is primarily driven by:

- Availability of low-cost labour for labour intensive knitwear and woven garments manufacturing
- Bangladesh's LDC status providing the country preferential low tariff access to developed markets

As per Bangladesh's Perspective Plan 2041 – *"Bangladesh is expected to finally graduate from the LDC status by 2024 putting our exports under stress due to significant preference erosion in key markets. Preliminary simulation results suggest that the loss of preferences in the markets of European Union, Canada, Australia, Japan, India and China in 2027 might lead to an annual reduction in total exports of Bangladesh by 11% or around USD 7 billion. Also, many of the exemptions of WTO provisions will no longer be available after 2024, except for*

EU which allows a transition period of three years for EBA preferences until 2027. Therefore, the country has to prepare itself over the next few years to counter these losses."

In the above context, it is of utmost importance that Bangladesh diversify its exports basket beyond RMG. The Government of Bangladesh identifies export diversification as a pivot in the achievement of its objectives under the Perspective Plan of Bangladesh (2021-2041) and National Industrial Policy (2019).

However, to become competitive in the global market, Bangladesh needs to overcome significant impediments holding the country back from its true manufacturing and exports potential:

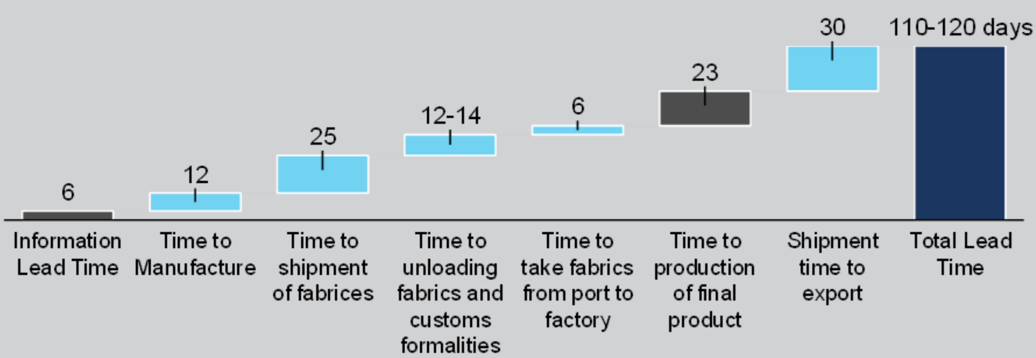
Country's logistics competitiveness is way behind its peers in South and Southeast Asia.

- As per World Bank's Logistics Performance Index 2018 rankings, the country ranked 100th out of a total of 160 countries – compared to 26th rank for China, 32nd rank for Thailand, 39th rank for Vietnam and 44th rank for India[68]
- Laggard logistics adds to overall business costs by increasing freight charges and lead time across sectors and commodities
- While operationalization of Matarbari deep seaport, will provide a huge boost to logistics in Bangladesh, significant quantum of work would still need to be done on hinterland connectivity and logistics infra including construction and widening of roads, boosting rail connectivity, promoting container movement via rail and creation of inland container yards and depots.

Case of typical lead time of Bangladesh's RMG export

At present, the typical lead time of Bangladesh's RMG export is 110-120 days, as against 30-40 days by China and Vietnam (highlighted in the exhibit below). It is estimated that ~ 58% of lead time is spent in shipping / in unloading delays. Bangladesh ranks 100th (2018) as per WB's Logistics Performance Index, as against Vietnam (39), India (44), China (26), Thailand (32) and can significantly improve it.

As Bangladesh explores alternates to RMG exports and increase its export basket, a key success factor would be logistics competitiveness. The development of Matarbari Port and manufacturing hub at MIDI can become one such step in this direction. **It is estimated that manufacturing at MIDI can reduce ~20% of the lead time due to larger vessels, efficient operations, and port-proximate manufacturing.**



[68] https://lpi.worldbank.org/international/global

Country's needs to significantly improve in its "Ease of Doing Business"

- A foreign investor evaluates the country based on its "Ease of Doing Business" and overall investment climate
- The ease of doing business is also an important determinant of its competitiveness in the global supply chains and exports
- As of 2020, Bangladesh ranked 168th of the total 190 countries in World Bank's ease of doing business ranking
- Comparison of Bangladesh's ranking with other countries in South and Southeast Asia is tabulated below

For Bangladesh to become a suitable investment cum exports processing destination, it needs to work on improving its ease of doing business.

Exhibit 46: Comparative ranking on various Ease of Doing Business indicators (2020)[69]

#	DB Indicator	Bangladesh	India	Sri Lanka	Philippines	Thailand	Vietnam
1	Starting a business	131	136	85	171	47	115
2	Dealing with construction permits	135	27	66	85	34	25
3	Getting electricity	176	22	89	32	6	27
4	Registering property	184	154	138	120	67	64
5	Getting credit	119	25	132	132	48	25
6	Protecting minority investors	72	13	28	72	3	97
7	Paying taxes	151	115	142	95	68	109
8	Trading across borders	176	68	96	113	62	104
9	Enforcing contracts	189	163	164	152	37	68
10	Resolving insolvency	154	52	94	65	24	122
	Overall DB rank	**168**	**63**	**99**	**95**	**21**	**70**

Country attracts minimal FDI

- Despite rapid economic growth over the past decade, Bangladesh attracts minimal FDI compared to its regional peers
- The long-term rate of FDI inflow in Bangladesh is pegged at ~1% of GDP (one of the lowest in Asia), contrasted with similar sized economy of Vietnam which receives FDI to the tune of 4-5% of its GDP[70]
- While ease of doing business is an important aspect for attracting FDI, other key measures include strategic trade policy, better tariffs regime, harmonized customs clearance, etc.
- Bangladesh can take lessons from other regional players to draw a red carpet for foreign investors looking to diversify their supply chains

If Bangladesh is able to augment its logistics infra, improve on its ease of doing business ranking and attract global investors, then backed by its inherent advantage of easy and low-cost labor, the country can firmly position itself as a premiere export-oriented supply chain diversification hub.

Classic case in point is Vietnam, which has emerged as a top alternate for global supply chain shifts and diversification. Exports of Bangladesh and Vietnam were very similar at ~USD 5 billion in 1990s, but since then Vietnam has surpassed

[69] As per World Bank
[70] As per World Bank

expectations to clock ~USD 280 billion exports in FY20.

Hence, while Bangladesh has a lot to do in order for it to become an export oriented destination, the potential upside more than makes up for the effort and investments required to achieve the same.

Assuming Bangladesh works on its competitiveness, the next section details an illustrative export industry that may come up at MIDI in medium-long term.

However, it must be noted that attracting industries to MIDI cannot wok in isolation and is tied to Bangladesh's overall position in the global context.

Illustrative example export - Pharmaceutical complex

Industry snapshot

Pharmaceuticals industry is one of the fastest growing industries in Bangladesh, recording a CAGR of ~17% over past 6 years.

The pharma industry in Bangladesh is dominated by generic drugs, contributing to ~80% of the drugs produced in the country. For active pharma ingredients (APIs), Bangladesh is still highly dependent on imports from China and India and GoBD aims to reduce import-dependence[71].

Market size of pharmaceuticals and API

- **Pharmaceuticals** – The domestic market size of pharmaceuticals was estimated to be ~USD 2.7-2.8 Bn in 2020 as per BIDA. The domestic market is highly concentrated with top 10 players catering to ~70% of the overall demand. Further, ~98% of the domestic demand is met through local manufacturing.

  On exports side, the market size was estimated to be ~USD 0.1-0.15 Bn, with a growth rate of ~15% in last 5 years. The major export destinations include Sri Lanka, Myanmar, USA, Australia and UK.

- **Active Pharmaceutical Ingredients (APIs)** – The market size of APIs in the country was estimated to be ~USD 0.65-0.68 Bn, with high dependency on imports (more than 90%).

Bangladesh's Competitiveness

- Only LDC country with a strong base in the pharmaceuticals industry. Patent waivers extended by WTO (World Trade Organization) for pharma products to its LDC member countries (for next 10 years)
- **Low cost of production – 10-15% lower than the cost of production in competing countries such as India and China**[71]
- Strong growth – global generic drugs market growing at a rate of 8%; Bangladesh has a strong base in generic drugs formulation
- Conducive Govt policy and incentives
  - Provision of export subsidy (7% on pharmaceutical products and 20% on APIs)
  - API policy, 2018 – aims to raise API export income

Opportunity at MIDI

Given, Bangladesh's strong expertise in generic drugs manufacturing and GoBD's targets of increasing the export share of pharmaceutical products and expanding export base in global APIs market – a export-oriented pharma manufacturing complex may be set-up at MIDI.

Pharmaceuticals complex at MIDI can

- **Utilize imported APIs** or base chemicals for APIs to produce generic drugs and formulations for exports across the globe
- **Rely on upstream chemicals complex** to provide part of feedstock requirements
- Further, **get easy access to major shipping lines and routes** via proximity deep seaport

[71] As per BIDA estimates

- Manufacturing capacity target for MIDI – ~1,100-1,400 Mn bulk dosages
    - Land requirement – 200-220 acres
    - Power requirement – ~6-7 MW
    - Employment generation – ~3500-3600 jobs

6.7. MIDI - Manufacturing Roadmap

Basis sector-wise analysis and identified capacities, snapshot of MIDI's manufacturing hub is provided below:

Exhibit 47: Industrial setup at MIDI in 2041- Area & Configuration

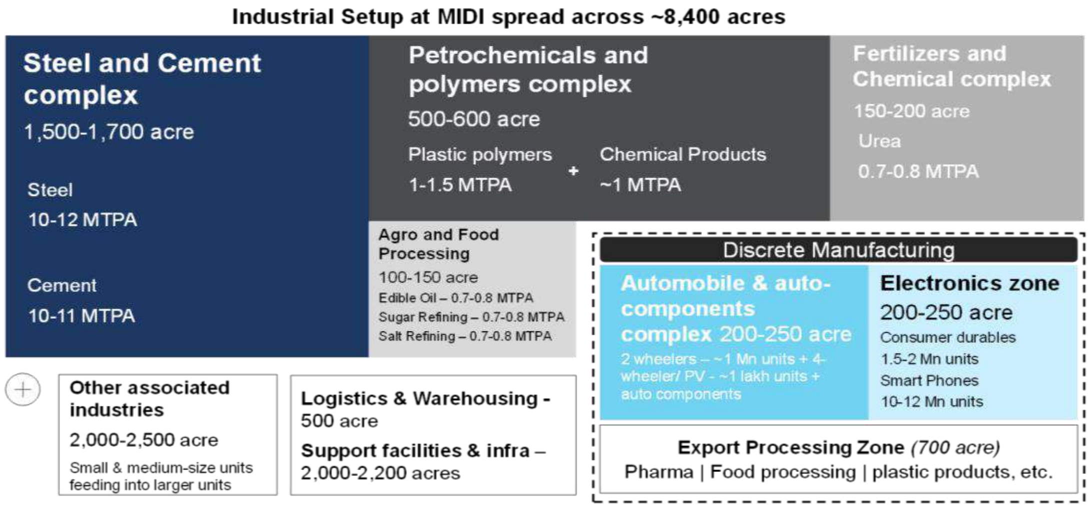


Exhibit 48: Manufacturing Hub at MIDI – Sector-wise contribution

Industry	*Manufactured Products*	*Size at MIDI (2041)*	*Contribution to BD*
1. Attract bulk / material industries and become a supply hub			
Steel	Long-steel from scrap	10-12 MTPA	~30% of BD steel demand
Cement	Grinding units	10-11 MTPA	5-7% of BD demand
Sugar	Refining of raw sugar	0.7-0.8 MTPA	25-30% BD demand
Salt	Refining of salt	0.7-0.8 MTPA	25-30% BD demand
2. Create manufacturing value-add opportunities for Bangladesh			
Petrochemicals and chemicals	Downstream petrochemicals + chemical products	~1 MTPA downstream chemicals	Only region to produce primary petchems in BD
Plastic polymers	Polymer manufacturing	~1-1.5 MTPA	25-30% of BD demand
Fertilizer	Urea manufacturing	0.7-0.8 MTPA	25-30% of BD demand
Edible Oil	Soya bean crushing and oil production	~0.7 MTPA	25-30% BD demand
3. Diversify into discrete and export-oriented manufacturing			
Automobile	2W and 4W assembly from imported SKD/ CKD		
Electronics	Consumer durables & electronics assembly		
Pharma	Bulk drugs and generic formulations manufacturing		
Synthetic fibers	Synthetic fibres and fabrics		
Plastic products	Production of end use products and packaging materials		

6.7.1. Manufacturing hub ramp up

With reference to manufacturing potential at MIDI for 2041, industry wise ramp up is provided below. **Phase-wise targeted implementation will help MIDI achieve ~10% of Bangladesh's manufacturing output by 2041.**

	8 years (2030)	9-14 years (2035)	15-19 years (2041)
Portfolio Description	**Bulk Process Industries:** Anchor investments	**Bulk Process Industries:** Investments in downstream activities Added investments in core manufacturing **Discrete & Export Industries:** Establishment of small-scale units by anchor investors	**Bulk Process Industries:** Sustain / expand **Discrete & Export Industries:** Sustain / expand existing Add new investments
Steel 10-12 MTPA	Billet making through EAF 1.5-2.5 MTPA	Integrated long-steel manufacturing (Billet + Long-steel products manufacturing) 10-12 MTPA	
Cement 10-11 MTPA	Cement grinding 3-4 MTPA	Cement grinding capacity 10-11 MTPA Large clinker manufacturing unit may be considered by 2041	
Fertilizer 0.7-0.8 MTPA	Urea manufacturing 0.7-0.8 MTPA	Urea manufacturing 0.7-0.8 MTPA Downstream industries utilizing ammonia as key feedstock may come up - chemicals, textiles, pesticides, water purification, etc.	
Polymers & Petchem	Polymers – 0.5 Petrochemicals and chemical products – 0.2 Production from imported feedstock	Polymers – 1-1.5 MTPA Petrochemicals and chemical products – ~1.0 MTPA Production using feedstock from MIDI's in-house refining cum petrochemical complex. Further, processing into end use products like plastic packaging, paints, etc.	
Food processing 2.5 MTPA	Edible oil (soya) – 0.7 MTPA (import of soya seeds to be crushed and refined into edible oil) Sugar – ~0.8 MTPA (refining of imported cane sugar) Salt – ~0.8 MTPA (refining of locally procured raw salt)		
Automobile 2W – 1Mn units 4W – 0.1 Mn units	NIL	2W – 1Mn units 4W – 0.1 Mn units Automobile CKD / SKD assembly units for assembly of imported automobiles	
Electronics Consumer durable – 2 Mn units Electronics and mobiles – 10 Mn units	NIL	Consumer durable – 2 Mn units Electronics (inc. mobiles) – 10 Mn units Assembly of imported consumer durables, smart phones and other electronic products for domestic / export purposes	
Export processing industries Pharma, plastics, synthetic fibres, etc.	NIL	Plastic products – ~0.2 MTPA Bulk drugs – 650 Mn dosages Synthetic fibres – 0.2 MTPA + others Use of imported raw materials and synergies with domestic manufacturing units within MIDI to establish export-oriented industries in medium-long term	

Pillar 3: Power generation & Energy

Key Takeaways

Together, energy imports and power generation constitute a very strong pillar for MIDI's vision 2041, contributing to energy security for Bangladesh.

MIDI's power generation portfolio, originally pegged at ~20 GW (out of which ~15 GW was coal), is expected to be revised to 10-15 GW.
This will be distributed as 1.8 GW in coal, 8-13 GW in LNG and ~200 MW in solar. In aggregate, by 2041, MIDI will have an installed capacity equivalent to ~20-30% of Bangladesh power demand.

It is understood that a substantial portion of land (~10,300 acres) has already been acquired by power division of Ministry of Power, Energy & Mineral Resources. Further, 1.2 GW coal-fired power plant Phase 1 (owned by CPGCBL) is nearing completion and expected to start operations in 2024.

MIDI will be a strategic part of Bangladesh's energy security plan
MIDI has strategic advantage because of deep draft & land availability and hence would be a natural choice for fuel imports for Bangladesh. Further, it can address Bangladesh's concerns on global price volatility, by providing strategic energy storage solutions.

Across energy sources, MIDI can cater to a bulk of country's energy imports.
The analysis shows that given its competitiveness, MIDI can take up ~2,000 (~80%) of LNG import and regasification, ~3 MTPA (60%) of LPG imports and 8-10 MTPA of crude imports.

Further, MIDI can be the strategic storage hub for LNG, LPG and Oil to meet country's peak demands.

Finally, POL refining at MIDI could be an import-substitution opportunity for Bangladesh.
Bangladesh's oil product demand is expected to expand 4.8-folds between 2019 and 2041. Due to limited refining capacity, Bangladesh has been historically importing refined products at a premium to meet 70-80% of its total refined demand. A 8-10 MTPA capacity (160 – 200 kbd) will support ~35% of total product demand by FY41, while helping to reduce Bangladesh's dependency on costly product imports.

7. Pillar 3: Power & Energy Hub

7.1. Power Generation

7.1.1. Bangladesh's power demand[72]

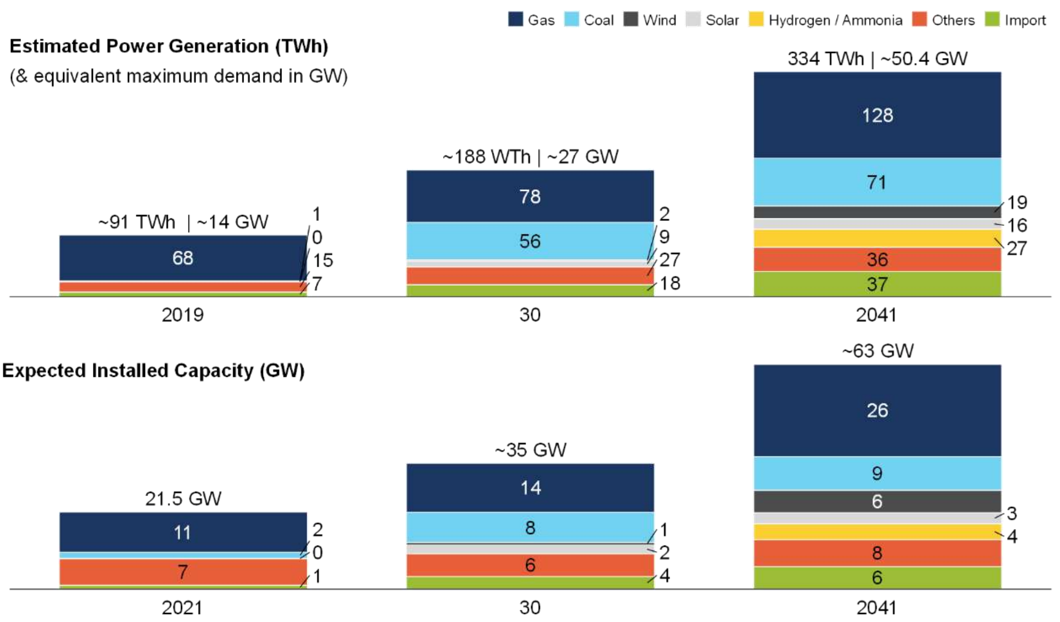
Bangladesh's total power demand is projected to reach ~333 TWh (translating to ~50 GW[73]) by 2041, growing at CAGR of ~6.7% p.a.
In 2021, the total power demand in Bangladesh was ~91 TWh (~14 GW), generated from Bangladesh's installed capacity of ~22 GW of power plants. In 2041, the installed capacity is expected to grow up to ~75 GW.

The draft Integrated Energy & Power Master Plan caps imported power at 10-11% in long term.
~90% of power will be generated within Bangladesh.

In short-term till 2030, Bangladesh will have over-supply in installed capacity, but new capacity will be needed after 2030 to service long-term demand.
Under-construction coal power plants (~6-7 GW) will come online by 2025-27, placing Bangladesh in a short-term power surplus till 2030-32**[74]**. However, most of existing coal & oil plants will retire by 2041 (to a limited capacity of ~6.5 GW) and this will necessitate new capacity starting 2032.

Gas / LNG and clean energy will be the predominant power sources in 2041.[75]
- Gas - ~32% of in TWh terms
- Coal – Max. ~10 GW (~21.5% in TWh)
- Clean energy - ~20% in TWh terms - wind, CCS based Gas, nuclear, ammonia, hydrogen and hydro.

Exhibit 49: Bangladesh's Power Demand Projections



[72] As per draft Integrated Energy & Power Master Plan (Dec '22)
[73] In-between-ATS Scenario, as per IEPMP. For PP-2041 scenario, projected power demand is ~63 GW.
[74] In 2030, installed capacity of ~35 GW is expected across existing and under construction plants – Hence, no new power capacity is theoretically required.
[75] Refer Table 4.3-1, Appendix C of IEPMP

7.1.2. Power mix evaluation

IEPMP discusses several potential sources of power that Bangladesh can utilize as part of its country power mix, such as:

- Traditional Fuel – coal, oil, natural gas, traditional biomass
- New Energy – Nuclear, Hydro, Solar, Wind, Biomass, Ammonia / Hydrogen.

Note on LNG power generation in Bangladesh

LCOE of LNG based power plant used for analysis in this report, has been computed at LNG procurement price as per long-term procurement contracts with Oman / Qatar (USC 5-6 per KWh).

It must be noted that procurement price as per recent spot market procurement is computed as USC 19-19.2 per KWh, which is not viable for power generation (power tariff in Bangladesh is UCS 10-11 per KWh).

Hence, this report assumes that future LNG procurement will be at long-term procurement rates, to make LNG-based generation financially viable.

Each energy source has been analysed based on IEPMP recommendations and fit to MIDI region.

LNG, Coal and Solar power were found most fit for 2041 portfolio of MIDI:

- **LNG – High potential**
  MIDI acting as an LNG import hub via FSRU and land-based terminal makes natural gas an ideal source of power generation for the region.

- **Coal – Medium potential**
  CPGCBL's coal power plan phase 1 (1.2 GW) is well under construction. along with Orion Group's coal plant (635 MW) proposed to be shifted from Munshigani to MIDI.

  However, no further coal capacity will be considered at MIDI, in line with the decision of GoBD to limit coal power generation.[76]

- **Solar – Low potential**
  Solar Park PV generation has the most competitive LCOE out of all energy sources at 2.7USC/kWh, however solar park's land requirement is too high at 4,000 acres per GW.

Exhibit 50: Potential power generation sources

Energy source	Land required Acres/GW	PLF %	2030 LCOE USC/kWh	Capex B USD/GW	Emissivity tCO2 p.a./GWh
Natural gas	343	85%	6.2	0.7	203
Coal	982	70%	4.7	1.5	338
Nuclear	600	90%	5.2	2.9	N/A
Solar	4,000	20%	2.7	0.4	N/A
Offshore Wind	N/A	30%	9.4	1.8	N/A

[76] Most of common infrastructure (coal yard, ash pond) for Phase 2 of CPGCBL's power plant have already been developed as part of Phase 1. Also, the Phase 2 plant land is land-locked between Ash pond and Phase 1 plant land. Hence, overall loaded cost of Phase 1 may turn out to be higher, in absence of Phase 2. Further, the land for Phase 2 will need suitable reprogramming.

In long-term, MIDI can also take up future technologies like Hydrogen and CCUS, depending upon development of these technologies for industry-scale use. Offshore wind may also be evaluated subject to technical feasibility.

- **Wind** – IEPMP projects a growing share of offshore wind. This may be considered but will be dependent on environmental and technical feasibility assessment. As such, since no land allotment is required within MIDI, offshore wind could be considered in future for capacity addition post 2041.

Further, transition technology such as CCUS and low-carbon fuels production (ammonia, hydrogen) may significantly lower emissions than legacy technology, and would play a critical role in achieving decarbonization.

- **Ammonia / Hydrogen** – IEPMP projects a large move to hydrogen technology. As of today, the hydrogen technology is unproven at industry scale but is widely expected to play an important role in reducing CO2 emissions at coal / gas power plants in the future. Hence, future reprogramming of proposed coal and gas power plants into co-fired plants with hydrogen feedstock may be possible.

- **Carbon Capture, Utilization and Storage (CCS / CCUS)** – Similar to hydrogen, CCS / CCUS may be considered for the proposed gas and coal power plants, once the technology is proven at industry-scale. Carbon storage will be a crucial factor to determine feasibility at MIDI. Further, the captured carbon may also be used for downstream industrial uses. Technical feasibility of same will need to be assessed for this.

Other energy sources were considered but not found relevant for MIDI's strengths.

- **Oil –** Environmental risk due to its high emissions. IEPMP projects retirement of existing oil capacity to a ~1% share in Bangladesh's power composition by 2050.

- **Biomass** – Lack of suitable feedstock at MIDI and environmental risk due to its high emissions.

- **Nuclear –** Rooppur nuclear power plant is already in construction, apart from which Bangladesh has no current plans to expand; MIDI has no endowments in nuclear energy.

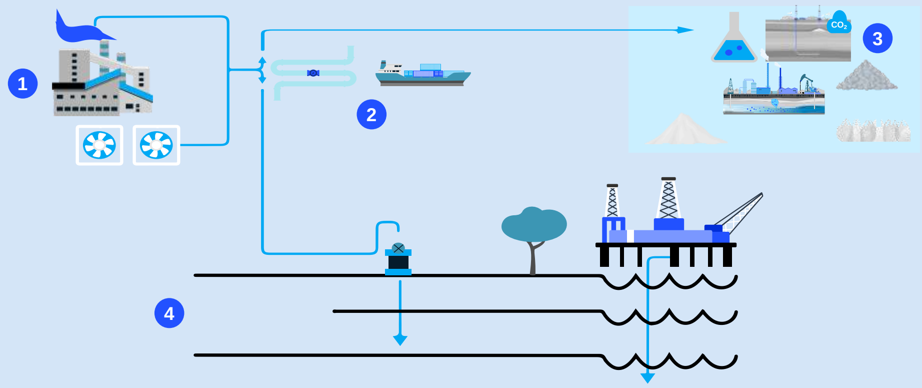
- **Hydro** – No hydro potential in MIDI.

Carbon Capture Utilization and Storage (CCUS)

Carbon capture can help Bangladesh meet its sustainability goals while achieving energy security. At COP26, Bangladesh made a significant commitment to eliminate ~22% of its annual carbon emissions by 2030. ~96% of this reduction is expected to come from the industrial sector; power sector being one of the major carbon contributors in the country (~55% of total carbon emissions) is expected to play a big role. However, thermal power is expected to continue to be a significant power source for Bangladesh, in light of the challenges concerning energy security and impediments to the development of renewable energy (mainly land constraints). In this light, Carbon Capture can help partially decarbonize thermal power generation and bridge the gap between Bangladesh's energy security and sustainability aspirations.

What is Carbon Capture Utilization & Storage (CCUS)?

CCUS[77] involves the capture of CO2 from large point sources, such as power generation or industrial facilities that use either fossil fuels or biomass for fuel. The CO2 can also be captured directly from the atmosphere. If not being used on-site, the captured CO2 is compressed and transported by pipeline, ship, rail, or truck to be used in a range of applications or injected into deep geological formations (including depleted oil and gas reservoirs or saline formations) which trap the CO2 for permanent storage



1 **Capture**

2 **Transport**

3 **Utilization**

4 **Storage**

CCU offers a potential means of decarbonizing thermal power generation, parallelly achieving both energy security and sustainable development goals. However, it will be essential to identify revenue sources from the captured carbon, in order to cover the costs of carbon capture and transport. In the case of MIDI region, the costs can be partially mitigated by:

- Supporting development of industries which utilize captured carbon
- Co-locating industrial offtakers to minimize transport costs
- Exploring alternate revenue streams like carbon credits from carbon capture

Further, details on CCUS is attached in Annexure.

[77] CO2 captured from sources other than point source is referred to as DAC (Direct Air Capture)

Notes on Ammonia / Hydrogen co-firing

Low-carbon ammonia / hydrogen co-firing achieve emissions reduction directly proportional to co-firing ratio and net lifecycle emissions of the ammonia / hydrogen source.

Currently, 20% co-firing is in the pilot phase, and 100% firing is in the pilot or in early prototype phase.

*Estimated emissions intensity of about **0.65 tCO2/MWh with 20% co-firing** and about **0 tCO2/MWh with 100% firing,** while **increasing LCOE by about 1.0 USC/kWh.***

Potential risk considerations of low-carbon ammonia / hydrogen include:

- Handling of toxic ammonia and potential leakage from storage.
- Handling hydrogen due to its flammability.
- Implementation of NOx-abatement measures for reducing air pollution
- Low-carbon ammonia / hydrogen sources must be certified for their low-carbon footprints

Recent project examples:

20% ammonia co-firing at Hekinan Power Plant by JERA

- In 2021, JERA started a project on ammonia co-firing at a large-scale commercial coal-fired power plant at Hekinan Thermal Power Station (1GW)
- Exp. ~20% ammonia co-firing by FY 2023

35% ammonia co-firing at Huaneng Yantai Power plant by China Energy

- In 2022, China Energy successfully demonstrated ammonia co-firing with coal at Huaneng Yantai Power Plant (40MW)
- 35% ammonia

7.1.3. Key considerations

Assuming the power mix is limited to coal, gas and solar as described above, MIDI's power scenarios are considered to be determined by four factors:

a. Maximum coal power generation
b. Transmission capacity
c. Attractiveness of MIDI for LNG power generation
d. Available land mass.

Coal generation at MIDI to be capped at 1.8 GW

As of 2020, there were 18 coal fired power plants proposed in Bangladesh. Of these, 12 plants with ~14.8 GW capacity were proposed in Matarbari across BPDB and CPGCBL[78].

In 2021, Government of Bangladesh, declared moratorium on 10 of the proposed power plants. Hence, currently only 8 coal fired power plants are approved and are being undertaken. These plants include:

- Matarbari USC Coal fire plant Phase 1 – 1.2 GW
- Matarbari USC Coal fire plant Phase 2 – 1.2 GW
- Orion[79] – 635 MW
- Payra Phase 2 – 1.32 GW
- Rampal Maitri – 1.3 GW
- Pataukhali Phase 1 + Phase 2 – 1.3 GW
- Barisal – 300 MW
- Banshkhali Chittagong – 1.2 GW

Of these, the top 3 are in Matarbari. However, basis conversations with JICA and Power division of Ministry of Power, Energy and Mineral Resources, the following power plants are considered for future planning at MIDI:

- Matarbari USC Coal fire plant Phase 1 – 1.2 GW
- Orion Group plant - 635 MW

Hence, coal generation capacity at MIDI is assumed at 1.8 GW.

Transmission capacity from MIDI

With sufficient fuel import capacity, MIDI can theoretically generate surplus power beyond the captive requirements within MIDI. This surplus power would need to be transmitted to Chittagong and Dhaka zones.

As per power division, 2 transmission lines are planned for MIDI:

- Matarbari – Madunaghat (Chittagong) - Meghnaghat (Dhaka) 400 kV double circuit line – Nearly completed
- Moheshkhali – Madunaghat (Chittagong) - Bhulta (Dhaka) 765 kV double circuit line - Proposed[80]

The first transmission line (400 kV) connecting MIDI to Dhaka via Chittagong is nearly completed and expected to be operational in early part of 2023.

However, there may be difficulties to construct the additional 765 kV transmission line to Dhaka due to Right of Way issues through a narrow chicken-neck corridor of Feni area (restricted to ~20 km)[81]. IEPMP also expresses concerns on transmission of power from Chittagong region to Dhaka, due to such limitations on power transmission capacity.

Assuming both lines will come up by 2041, power transmission capacity from MIDI is expected as below:

- 400 kV 2cct - ~3.8 GW[82] by 2023
- 400 kV + 765 kV 2cct - ~10.8 GW[83] by 2035

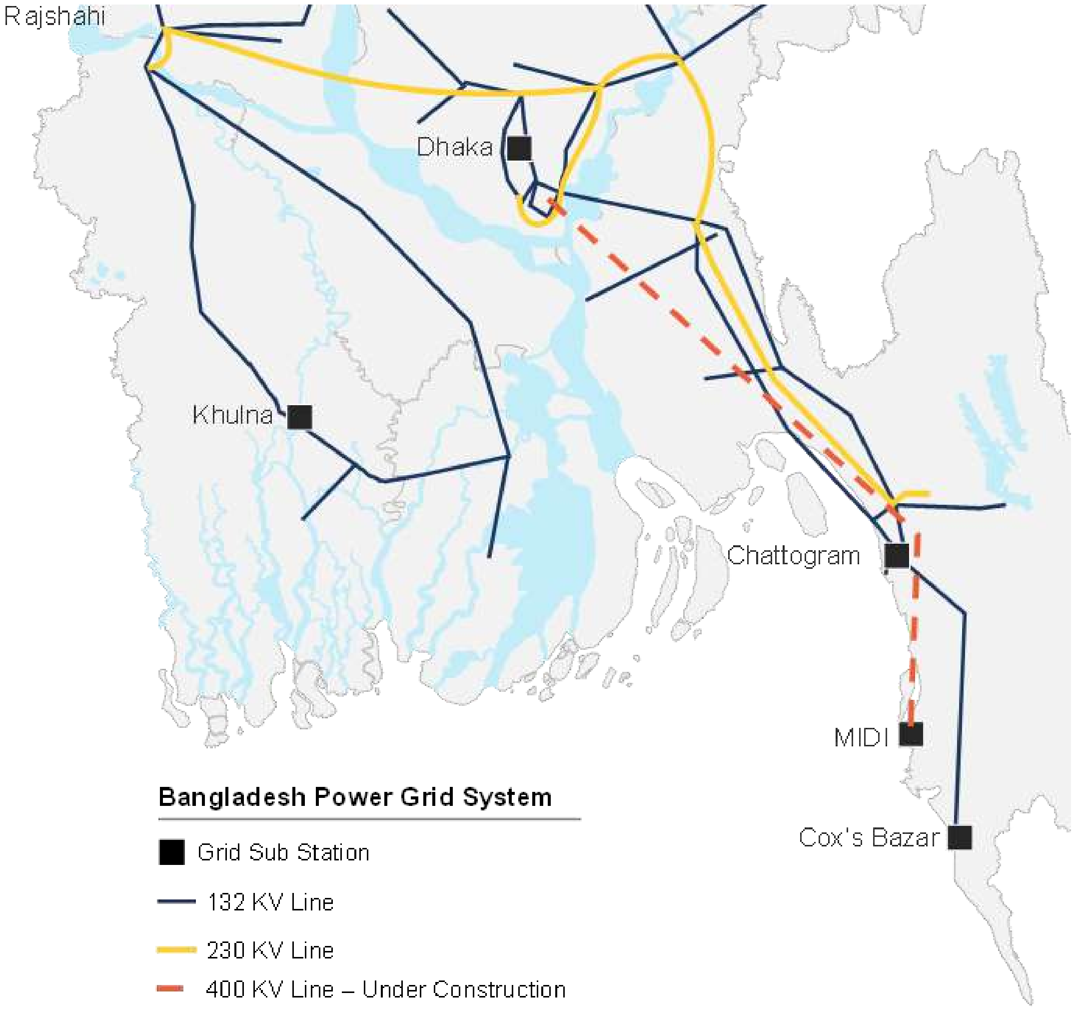
[78] 8 block of coal plant of ~10.5 GW in total by BPDB, 4 coal power plants of ~4.3 GW by CPGCBL
[79] Orion Group's plant was originally at Munshiganj but has now been allotted land at MIDI. Feasibility study ongoing.
[80] Construction of 400 kV is facing difficulties in ROW acquisition through narrow Feni area (20 km width). Similar difficulties are expected in proposed future construction of 765 kV line.
[81] As per discussions with Power division, the under construction 400 kV transmission line itself faced significant delays in RoW procurement.
[82] As per IEPMP, transmission capacity of 400 KV(A) = 2.77 GW/Cct. Hence, 400 kV(A) 2cct will have total capacity as ~5.5 GW. Incorporating N1 contingency, capacity considered = 5.5 GW * ~67% = 3.8 GW
[83] As per IEPMP, transmission capacity of 400 KV(A) = 2.77 GW/Cct; 765 kV = 5.3 GW/cct. Hence, 400 kV(A) 2cct + 765 kV 2cct will have total capacity as

Hence, assuming that the 765 kV line is completed as planned, the total power transmission capacity from MIDI to Dhaka / Chittagong will be capped at ~10.8 GW by 2041[84].

Considering the above, total installed generation capacity at MIDI, which can be supported by planned transmission infrastructure, will be 16.6-16.8 GW[85].

- Intrinsic power demand – ~3 GW[86]
- Transmission capacity outside MIDI – 10.8 GW
- Assuming reserve capacity @20%[87], total maximum installed capacity at MIDI – 16.6-16.8 GW

Exhibit 51: Transmission network from Matarbari



Attractiveness of MIDI for LNG power generation

In future, new LNG power plants will be distributed between demand centres and LNG import hubs, former being the more likely choice.

16.1 GW. Incorporating N1 contingency, capacity considered = 16.1 GW * ~67% = 10.8 GW

84 considering N1 contingency, as per IEPMP

85 While additional transmission capacity between Chittagong zone to Dhaka may not be possible due to Right of Way constraints, MIDI may potentially cater to internal demand of Chittagong zone (incl. Cox's Bazar). IEPMP projects internal demand of Chittagong zone as ~9 GW (~16.5% of total Bangladesh demand) in 2041. This will however be subject to additional transmission line from MIDI.

86 As per assessment, power demand for proposed manufacturing hub at MIDI is expected to be ~2 GW in 2041. Incorporating other uses (port, logistics, residential, social infra etc.), the total power demand at MIDI is expected to be ~3 GW by 2041.

87 IEPMP assumes reserve capacity in 2040 as 25% and 2050 as 20%

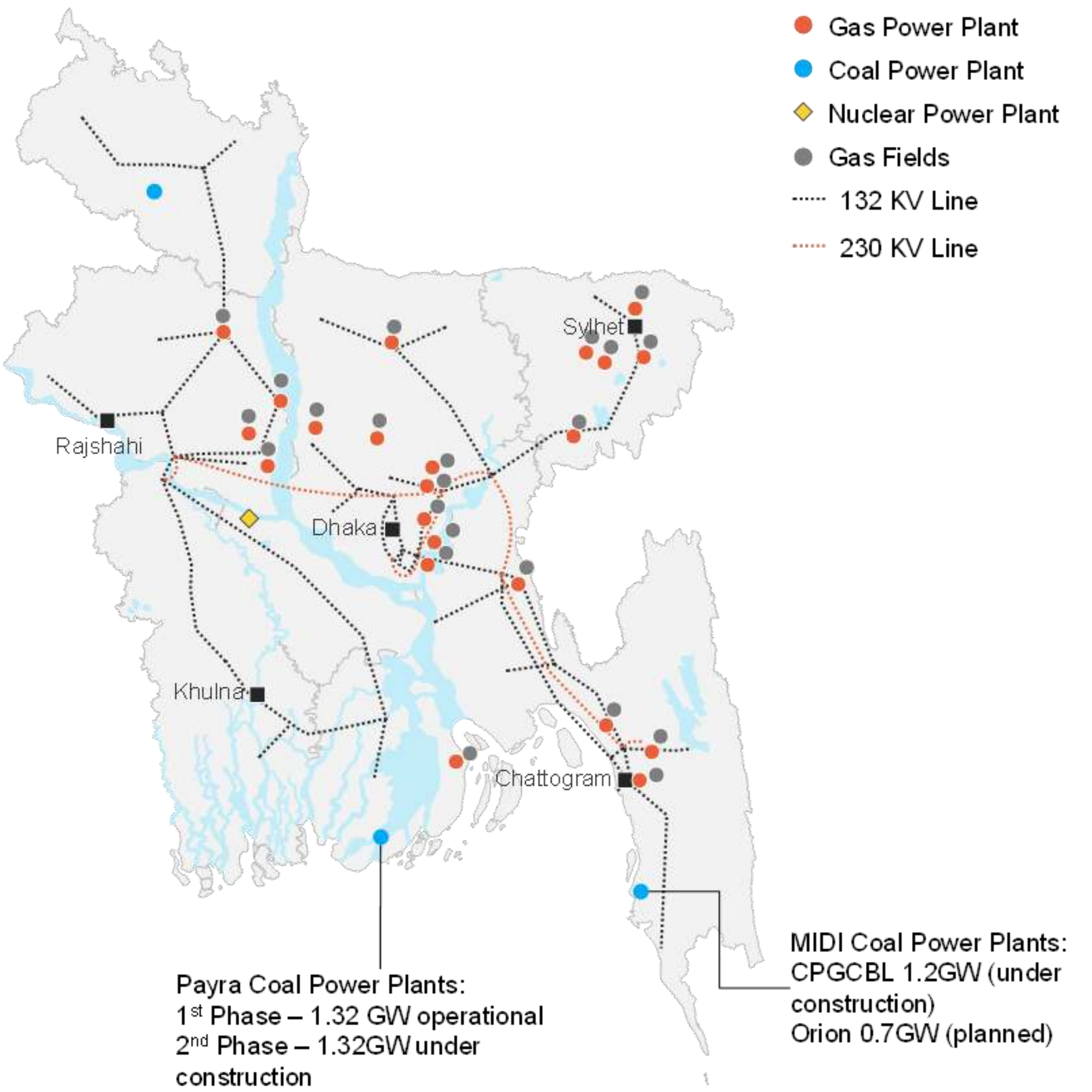
Future gas power plants will mostly likely be based on imported LNG (blended LNG + domestic gas). Hence, in principle, it makes sense to set up LNG power capacity closer to ports (in this case, mostly Matarbari port), where power plants can access imported LNG faster, more efficiently and without dependency on long-range pipeline infrastructure. However, such capacity will depend upon availability of reliable transmission capacity from Matarbari to demand sinks.

On other hand, since good LNG evacuation capacity already exists from Matarbari port to Dhaka (~1,350 mmcfd pipeline capacity currently; planned to be upgraded to ~3,500 mmcfd), this facilitates the power plants to come up anywhere along the LNG grid. Hence, power generation companies may also choose to be closer to demand sinks like Dhaka, Chittagong. This will allow de-risking against poor / inefficient transmission infrastructure.

Further, IEPMP advocates against build-up of excess power generation capacity in Chittagong zone (which includes MIDI), because of 1) limitation of power transmission capacity from Chittagong to Dhaka (discussed above), 2) Concerns of power security because of excess concentration in one region.

Considering these factors, gas power generation at MIDI is attractive but will be much smaller than existing gas power hubs like Dhaka.

Exhibit 52: Location of Power Plants in Bangladesh



Attractiveness of MIDI for solar power
Solar power may not be the best economic use of the MIDI land pool:

- Amongst the lowest yield[88] power generation use-case for the prime port-side land at MIDI.
  - Gas power plant: USD ~500 per annum per acre
  - Solar power plant: USD ~73 per annum per acre

- Solar power can't be used for peak load requirements and hence, may not be the most reliable source for Bangladesh's needs.

- Given the limitations on power transmission capacity from Chittagong zone to Dhaka, the output of solar plants will further limit the power which can be transmitted on a per acre of power generation basis.

Land availability
Substantial land plot (~10,300 acres) has already been acquired by Power Division, across BPDB and CPGCBL. This is equivalent to approximately 30GW of gas power plant capacity in MIDI.

- Bangladesh Power Development Board (BPDB) ~ 5,580 acres
- Coal Power Generation Company of Bangladesh Limited (CPGCBL) ~ 4,700 acres
  - Matarbari USCCP #1-4 ~ 1,200 acres
  - Kohelia Power Plant ~ 1,400 acres
  - Matarbari USCCP #5-6 ~ 1,500 acres
  - Other (non-specified) ~ 600 acres

The status of land acquisition for power and energy hub is attached in Annexure.

7.1.4. Sizing of power generation for MIDI in 2041

For 2041, two scenarios are possible for installed capacity at MIDI, using a mix of coal, gas and solar:

- **Risk-factored case: 10 GW installed capacity**
  - Targeting ~20% of power demand in Bangladesh[89]
  - 8 GW of gas, 1.8 GW of coal, 0.2 GW of solar, generating ~71 TWh.
  - **8 GW of gas power capacity would require ~950 mmcfd of LNG to operate,**[90] equivalent to ~25% of Bangladesh LNG demand in FY41[91]
  - Proposed plan would use ~4,600 acres (~45% of total available land) reserved for power-related purposes
    1. Gas – 2,800 acres
    2. Coal – 1,000 acres[92]
    3. Solar – 800 acres

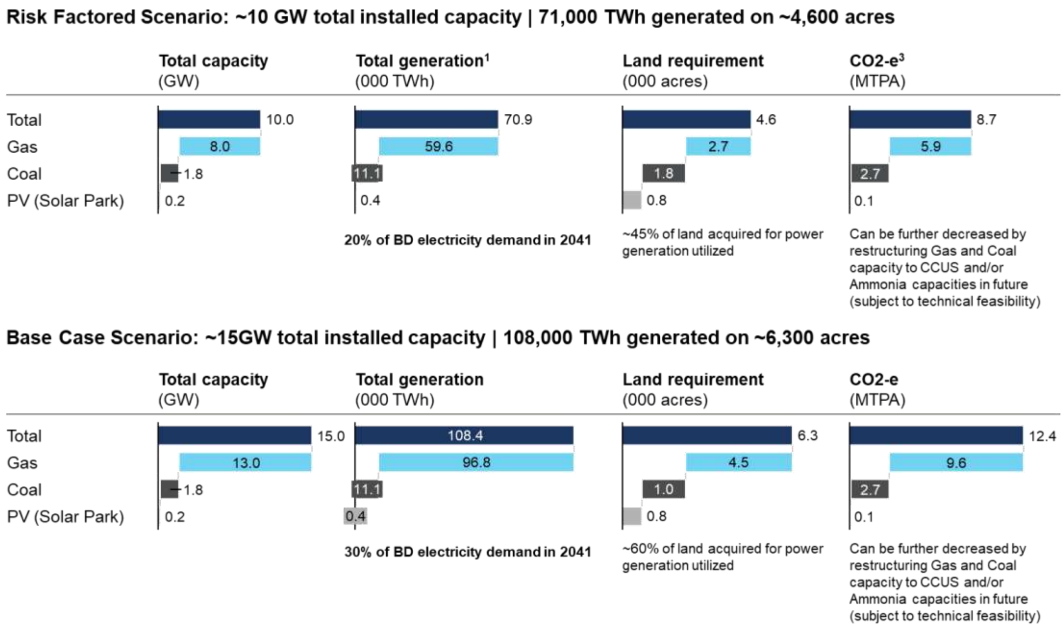
- **Base case: 15 GW installed capacity**
  - Targeting ~30% of power demand in Bangladesh[93]
  - 13 GW of gas, 1.8 GW of coal, 0.2 GW of solar, generating ~108 TWh.
  - Scenario 2 would send surplus power to other deficit zones near Dhaka up to ~6GW
  - 13 GW of gas power capacity would require ~1,540 mmcfd of LNG to operate[94] equivalent to ~41% of Bangladesh LNG demand in FY41[95]
  - Proposed plan would use ~6,300 acres (~60% of total available

[88] Computed as difference between Revenue per annum @USC 10 per unit and LCOE
[89] Power demand of Bangladesh being ~50 GW in 2041, as per In-between-ATS scenario of IEPMP
[90] LNG required for power generation assessed at ~118 mmcfd/GW
[91] 2041 LNG total demand expected to reach 3,722 mmcfd – more on subsequent LNG section
[92] For 1.2 GW CPGCBL Matarbari phase I + ~600-acre Orion plant (note – future expansion and soil stockpile area excluded from Matarbari Phase I, II to arrive at only Phase I area)
[93] Power demand of Bangladesh being ~50 GW in 2041, as per In-between-ATS scenario of IEPMP
[94] LNG required for power generation assessed at ~118 mmcfd/GW
[95] 2041 LNG total demand expected to reach 3,722 mmcfd – more on subsequent LNG section

land) reserved for power-related purposes

i. Gas – 4,500 acres
ii. Coal – 1,000 acres[92]
iii. Solar – 800 acres

Exhibit 53: Installed capacity of power generation at MIDI in 2041



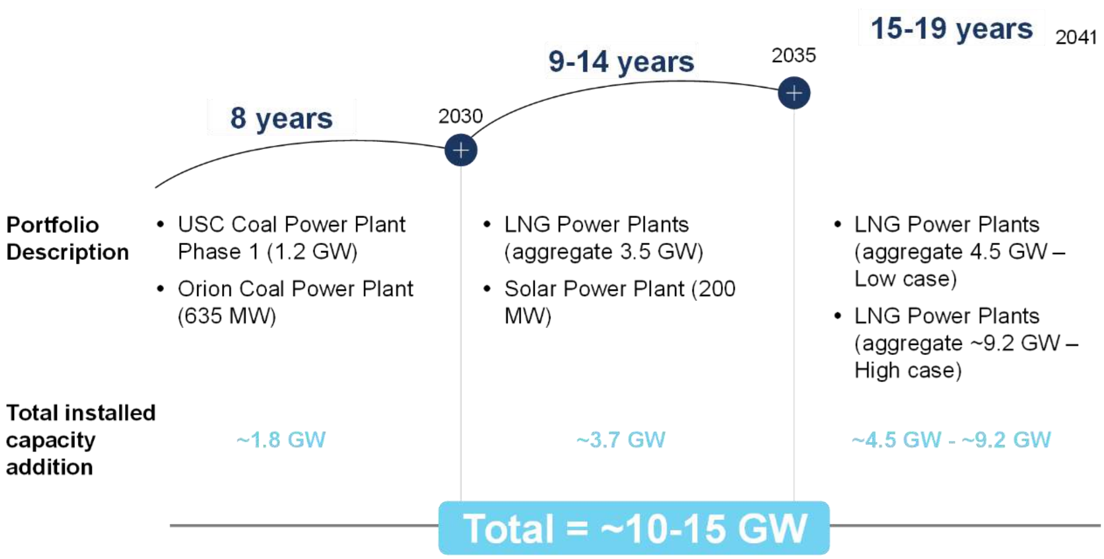
Source: Integrated Energy and Power Master Plan – Draft Final Report (#2 Draft), McKinsey Global Energy Perspective

7.1.5. Ramp up of Power portfolio at MIDI

Across both scenarios, ramp up of installed capacity of power generation at MIDI in 2031 and 2036 is determined by mapping to following factors:

- MIDI's intrinsic demand
- Transmission infrastructure capacity available
- Progress of power generation projects at MIDI.

Exhibit 54: Ramp-up of Power Generation at MIDI



Portfolio details:

All numbers in GW	**2023-30**	**2031-35**	**2035-41 Risk-factored Case**	**2035-41 Base Case**
Installed Capacity at MIDI - Coal	1.8	1.8	1.8	1.8
Total Installed Capacity in Bangladesh - Coal	8.5	9.2	10	10
%ge of Bangladesh's installed capacity - Coal	21%	20%	18%	18%
Installed Capacity at MIDI - Solar	-	0.2	0.2	0.2
Total Installed Capacity in Bangladesh - Solar	2.5	2.7	3	3
%ge of Bangladesh's installed capacity - Solar	-	7%	7%	7%
Installed Capacity at MIDI - LNG / Gas	-	3.5	8	12.7
Total Installed Capacity in Bangladesh - LNG / Gas	13.8	18.3	25.8	25.8
%ge of Bangladesh's installed capacity - LNG / Gas	-	19%	31%	49%
Installed Capacity at MIDI	1.8	5.5	10	14.7
Maximum Demand in Bangladesh	27	35.7	50	50
%ge of Bangladesh's Demand	7%	15%	20%	29%
Theoretical cap on generation capacity[96]	3.8	6.3-16.6[97]	16.6	16.6
Land requirement			4,600 acres	6,300 acres

Note

- Coal power generation area has only been considered for 1.2 GW CPGCBL Matarbari Phase I + ~600-acre Orion plant
- Future expansion and soil stockpile area have been excluded from Matarbari Phase I, II plan to arrive at only the Phase I area (please refer to annexure for details)
- The residual area earlier earmarked for Matarbari Phase II can now be utilized by CPGCBL / GoBD for other developmental purposes in MIDI

[96] Due to transmission capacity cap
[97] With and w/o 765 kV line

7.2. POL Refining & Imports

As per IEPMP, Bangladesh's oil demand is expected to expand 4.8-folds between 2019 and 2041[98] to reach ~28.8 MT (~580 kbd). High Speed Diesel (HSD) accounts for ~71.5% of the total oil demand today, mainly driven by transport sector.

As against the demand, refining capacity within the country is limited, with heavy dependence on costly imports.

Bangladesh currently has only one refinery (Eastern Refinery Limited[99]) with capacity ~1.5 MTPA (~30 kbd). ERL is a simple refinery with NCI[100] of 2.4.

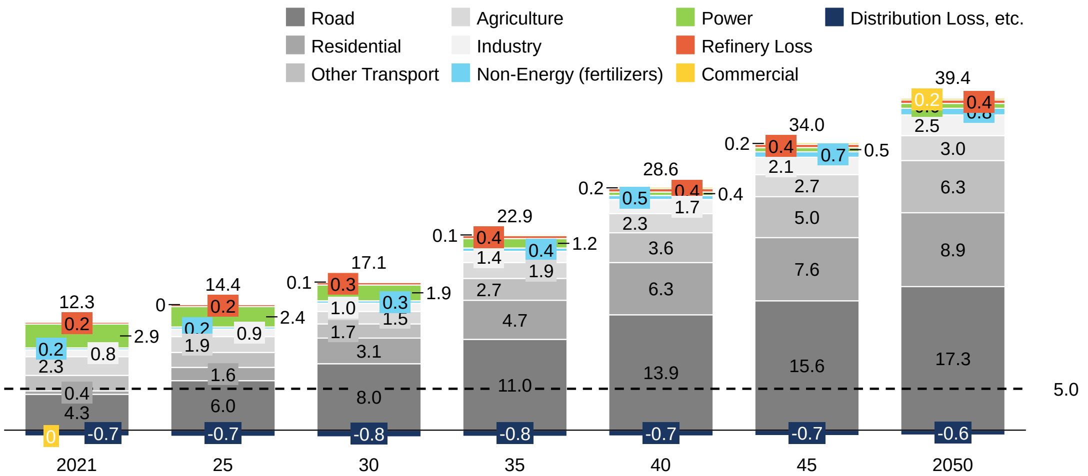
With growing POL demand and limited refining capacity, Bangladesh is paying a premium to import refined products. In 2021, product imports were USD 220 – 300 /ton more expensive than refining via imported crude[101]:

- ERL refining costs, including crude import: USD 682 /ton
- Diesel import cost: USD 902 /ton
- Jet fuel import cost: USD 941 /ton
- Gasoline import cost: USD 985 /ton.

Exhibit 55: POL demand in Bangladesh by products (MTPA)

Million Tons[2]	FY21		FY30	FY41
Crude Oil Refining	2		5	5
ERL	1.5		4.5	4.5
Private refineries	0.5		0.5	0.5
Product Imports	~8.9		~10 (9 – BPC + 1 private)	20.4
Diesel	~3.6 (BPC)	~4.4 (private)	~7.9	-
HSFO	~0.05 (BPC)		0.8 (BPC) + 1 (private)	-
Gasoline	~0.4		~1.2	-
Kerosene / Jet-A	~0.4		~0.8	-
LPG Imports	1.4		2.5	5
TOTAL POL Demand[102]	~12.3		17.3-17.6	28.8-30.7

Exhibit 56: POL demand forecast for Bangladesh by consumption sectors (Mtoe)



Note: dotted line represents currently proposed ERL capacity expansion of up to 5.0 MTPA

[98] In-between - ATS scenario (average annual growth rate of 3.8%).
[99] Owned by Bangladesh Petroleum Corporation
[100] Nelson Complexity Index. The NCI is measured on a scale from 1 to 20, where low numbers represent simple refineries which produce low-quality fuel, such as jet fuel and heating oil, and high numbers represent more complex refineries that produce high-quality light fuels, such as gasoline, kerosene, naphtha.
[101] As per PetroBangla data available on website
[102] Across In-between ATS and PP-2041 ATS scenarios

While capacity expansion of ERL is proposed to 5 MTPA by 2030, it still leaves 23-24 MT of oil demand to be met with product imports in 2040.

Hence, there is a need to evaluate further refining capacity within Bangladesh to enable import substitution.

Private sector interest in POL refining is opening up.
Historically, petroleum refining in Bangladesh was restricted to government jurisdiction. Bangladesh opened-up refining to private sector in 2009, and is gradually seeing investments over the last 10 years:

- Bashundhara Oil and Gas Company's bitumen plant in South Keraniganj (suburb of Dhaka), which has recently been commissioned in Feb 2020 with ~850,000 ton bitumen capacity[103].
- Super Petrochemicals Limited (part of TK Group)'s petrochemical plant at Chittagong, for naptha and hexane production[104], which was commissioned in 2013.
- TK Group has announced a ~6 MTPA oil refinery cum petrochemical complex at Matarbari, site work for which has already begun
- Bashundhara Group announced a ~4.7 MTPA refinery at Sitakunda, Chittagong (south of Mirsarai EZ) in 2021, currently in planning stage.

A discussion on refining within Bangladesh v/s continues dependence upon POL imports is presented below.

7.2.1. Global POL refining outlook

In determining whether oil demand should be met with refining or importing products, it is important to note the global trend in refining outlook.

Globally, decarbonization and technology advancements have been pushing POL demand downwards.

Global oil product demand is expected to peak around 2025, after which it would start falling due to transition to decarbonization technologies such as EV and sustainable fuels.

Road transport accounts for 70% of demand drop over time. While total person and ton miles in aviation and marine will grow, oil demand falls over time as the fuel mix becomes more diverse.

Chemicals will become the biggest demand segment by 2050.

Global refinery capacity is expected to keep growing in short-term, but will peak in 2025-27, after which capacities are expected to decline due to decreasing refining margins.

A net addition of ~5.6 Mn BPD between 2019 and 2027 has been announced despite peaking global oil demand.[105] Approximately half of all newly announced capacity will be built in the Middle East and China.

Our analysis shows that, 2022 refining margins will reach high levels due to high crude price and short-term utilization recovery post-COVID, additionally increased by delay in capacity additions.

In the late 2020s, margins will fall in line with utilization and due to lower crude prices. In the long-term refining margins will follow utilization trend and will stay below recent history.

[103] Feedstock capacity ~1.7 MTPA
[104] Naphtha production facility of 6,700 BPD, Naphtha processing facility of 4,000 BPD, hexane production facility of 1,000 BPD
[105] Based on announcements of refinery additions and closures worldwide

Exhibit 57: Global oil demand outlook (Mn barrels per day)

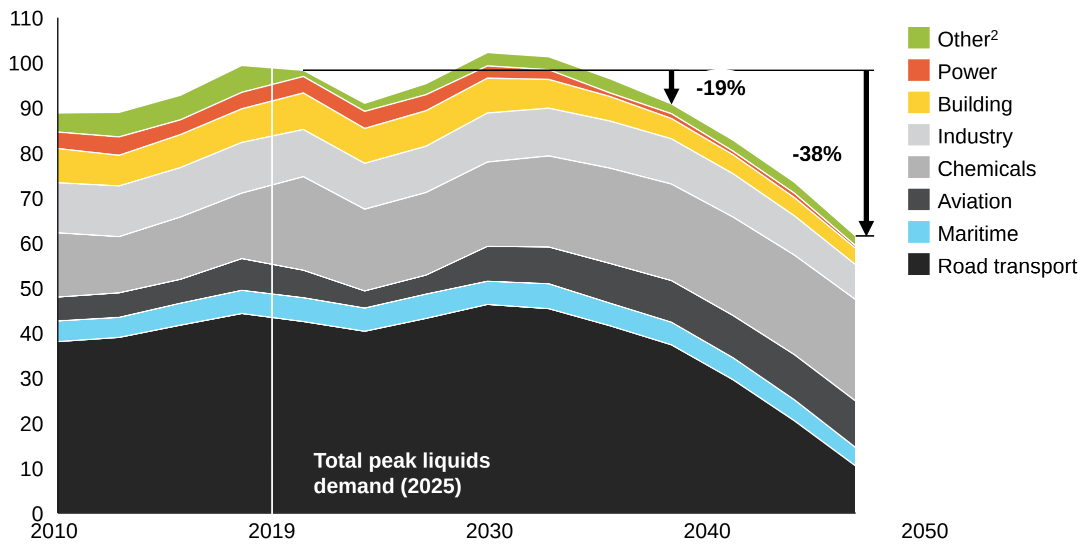
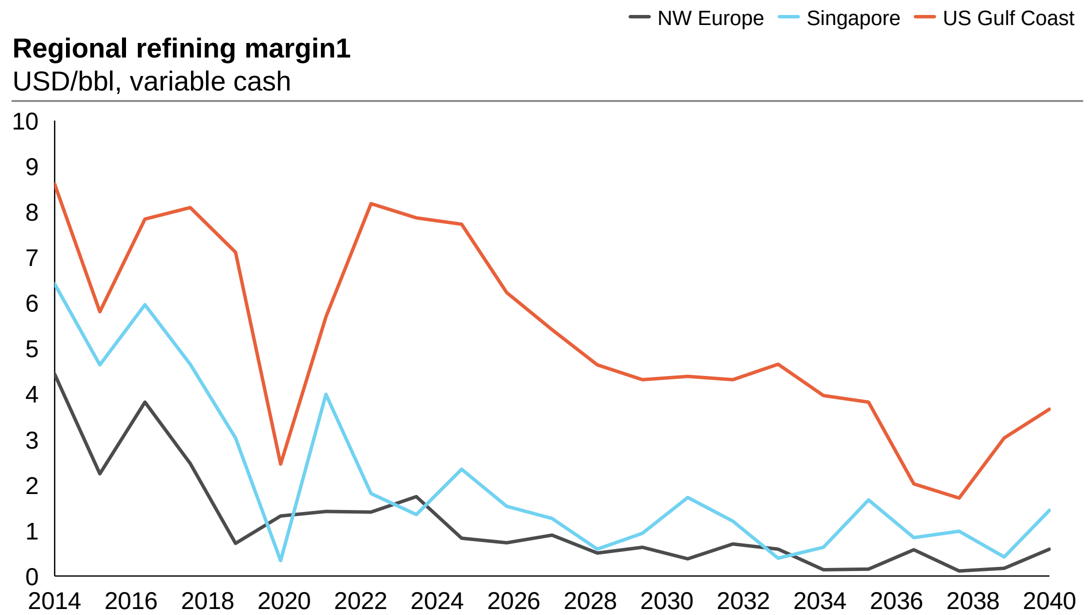


Exhibit 58: Refining margins (USD/bbl, variable cash)[106]



~30 million bbl/d equivalent of refinery closures are expected between 2025-40, due to falling global demand and margin, potentially opening up older refineries for sale.

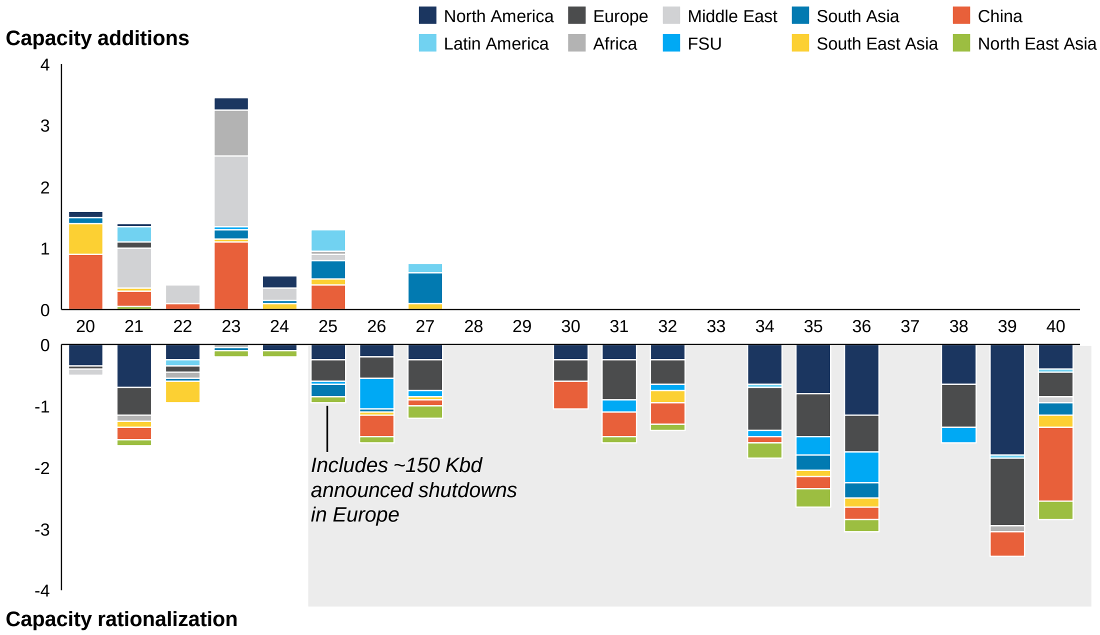
Majority of closures are expected to come from China, EU and North America.

In short-term (2021-2026), new refineries are expected to come in China, Asia and Middle East. While Middle East refineries will cater to demand from European markets, China and Asian refineries will largely cater to local & export-led petrochemicals demand.

Falling refining margin in developed economies, coupled with short-term increase in regional refining capacity in Asia, may lend credence to ample product import availability.

[106] Taken basis Fluid Catalytic Cracking (FCC) configuration of refinery for representative crude from Mars Crude Oil (for US Gulf Coast), Brent Crude Oil (for NW Europe), Dubai Crude Oil (for Asia)

Exhibit 59: Global refinery capacity rationalization



1. Start/closure date defined as first full year
2. Additions only include projects classed as Firm and Probable
3. Includes 0.125% per annum creep in the growing markets

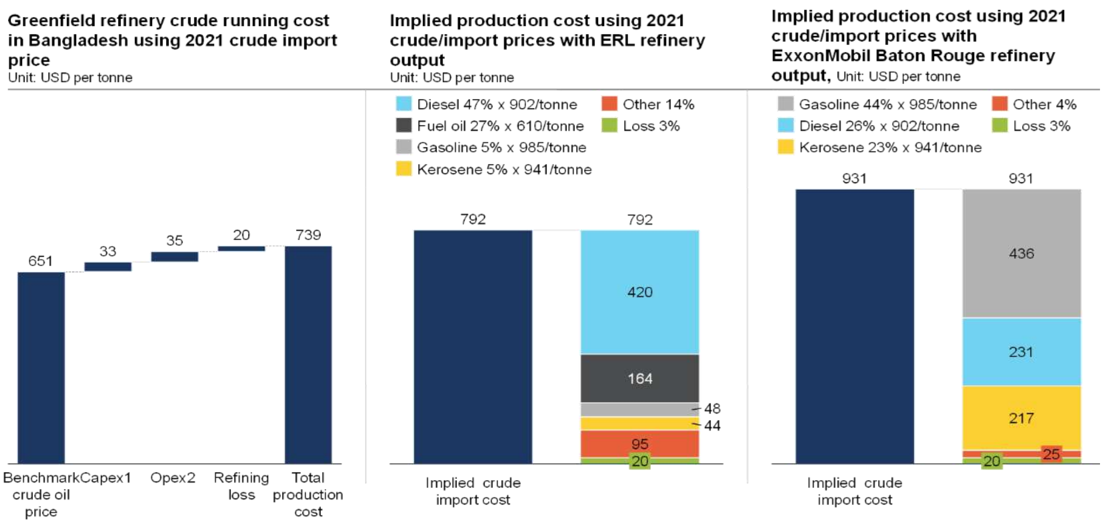
7.2.2. Import v/s Domestic Refining for Bangladesh

Despite a global outlook of ample product availability in short-term, setting up a refinery with 8-10 MTPA[107] CDU capacity can be cost-competitive for Bangladesh.

With greenfield capex accounted for, building a new modern refinery will enable refining crude oil at ~USD 740 /ton, as against an implied import cost of USD 792-931 /ton[108] for similar output configuration.

For every tonne of crude oil refined, a new refinery could save up to ~190 USD/tonne.

Exhibit 60: Greenfield Refinery Cost Economics at MIDI



[107] As per our analysis of global refineries, 8-10 MTPA is estimated to be most cost economical model for the possible configurations of products possible.

[108] Basis actual import cost of various products as reported by PetroBangla in 2021

- Given large number of refinery shutdowns in the region expected over next 3-5 years, Bangladesh could also explore second-hand / relocated refineries, which are relatively younger and have similar complexity & configuration as required for Bangladesh's needs. Some examples of expected closures are discussed below.

  Deals in second-hand refineries show that such purchases and reinstallations can be highly cost-effective and cheaper as compared to greenfield investments.

  Having said that, there are challenges associated with second hand refineries:
  - Each refinery is configured for a particular feedstock crude and for certain product outputs. Fitment of second-hand refinery to Bangladesh's needs and crude feed-stock available to Bangladesh is important to ensure its full use.
  - Demobilization, transport and mobilization are highly complex activities and need deep technical know-how and expertise. This can be challenging for many refineries.
  - If any of the key equipment of relocated refinery doesn't function, the can lead to wasted money and effort to transport and instal it.
  - Fuel efficiency of the relocated refinery may not be same as a modern refinery.

A large refining capacity within the country will ensure self-sufficiency for Bangladesh.

With low refining complexity, existing ERL refinery configuration is not fully optimized for higher value ends[109] and hence may not best configured to meet future POL demands,

Combined with proposed 5 MTPA refining capacity at ERL, a new 8-10 MTPA refinery could replace up to ~15 MTPA of imported products by 2041, which will constitute ~65% of POL imports projected in 2041 (excluding LPG).

Also, the new refinery can increase the slate of domestically manufactured products.

7.2.3. POL refining at MIDI

MIDI has natural advantage for POL refining due to its port-proximity and suitability for oil imports. Also, availability of land at MIDI enables to play a much larger role in POL refining and further downstream use cases.

Hence, an 8-10 MTPA refinery capacity is assumed for MIDI.

Existing proposals
TK Group, which has been allotted a ~450 acres land parcel in EZ 5, has announced development of ~6 MTPA oil refinery cum petrochemical complex. Civil work has already commenced at the site.

The oil refinery is expected to be commissioned by 2027. The feasibility of the refinery is currently ongoing. As per initial plan, the refinery will be programmed for distillation into diesel, fuel oil and other POL products to be supplied to BPC. This will be a relocated brownfield refinery. Eventually, a naphtha cracking unit will be added to the refinery by 2030 to produce downstream distillates.

Further, as per discussions with S. Alam Group, they plan to develop a 3 MTPA refinery (expandable to 5 MTPA) in EZ 5. S. Alam Group is in discussions with BEZA to procure ~600 acre for this development (current discussions ~200 acres, but group has indicated that they would require ~600 acres).

[109] (2021) Diesel 47%, Fuel oil 27%, Gasoline 5%, Jet fuel 5%, Other 14% - As per ERL annual report

Use of second-hand refineries

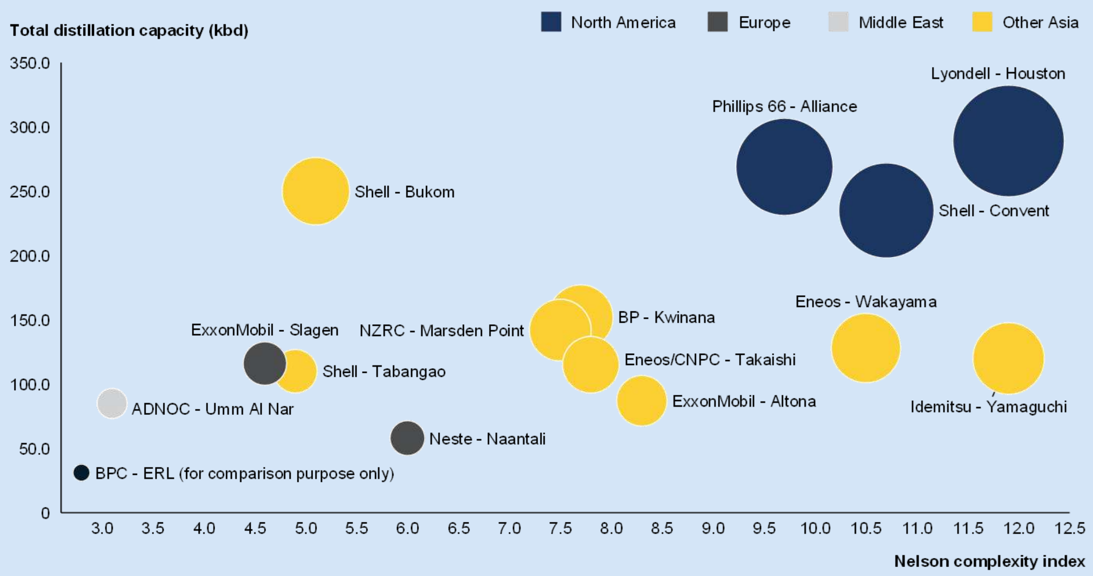
We studied refineries slated for shutdown between 2021-2025, to identify refineries which can have potential synergies for Bangladesh's needs.

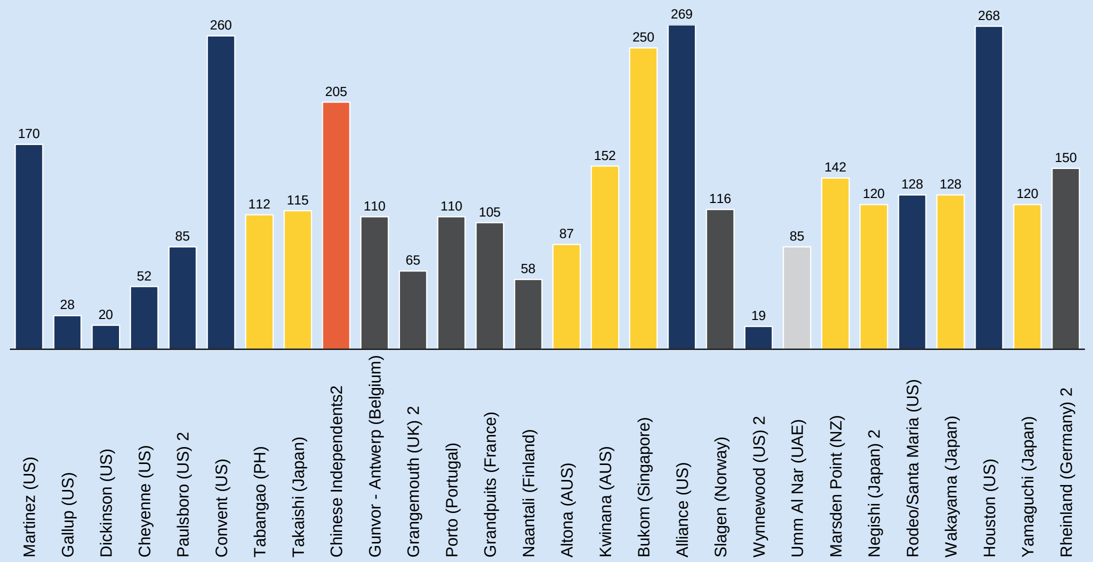
Average age of refineries announced for closure since 2021 is 66 years old, while average complexity index is 8.4, representing both a good mix of capacity and optimization.

Some refineries are in particular optimized for diesel production, some of them being:

- Shell – Bukom (250 kbd, NCI 5.1)
- ExxonMobil – Altona (87 kbd, NCI 8.3)
- NZRC – Marsden Point (142 kbd, NCI 7.5)
- ENEOS – Wakayama (128 kbd, NCI 10.5)
- Idemitsu – Yamaguchi (120 kbd, NCI 11.9)

Exhibit 61: Refineries expected for shutdown between 2021-2025 (Illustrative)





7.2.4. POL Imports

MIDI offers several advantages for oil imports:

- **Given its deep draft, MIDI will be able to cater to large oil tanker vessels (120,000 DWT) brining crude and POL products. This would reduce transport costs.**

  SPM at Matarbari will have a depth of 27 m, much greater than existing depth of 8-12 m at outer anchorage point of Chittagong.

- **The under construction single point mooring and pipeline infra will enable faster unloading of tanker and efficient evacuation to Chittagong.**

  SPM (>90% completed) at Matarbari will have a capacity of 9 MTPA (4.5 MTPA for Crude and 4.5 MTPA for High-Speed Diesel). Pipelines connecting the SPM to ERL (Chittagong) have also been >90% completed and will enable faster unloading of tankers, without any losses.

- **MIDI can also support emergency crude stockpiling and hence support energy security for Bangladesh.**

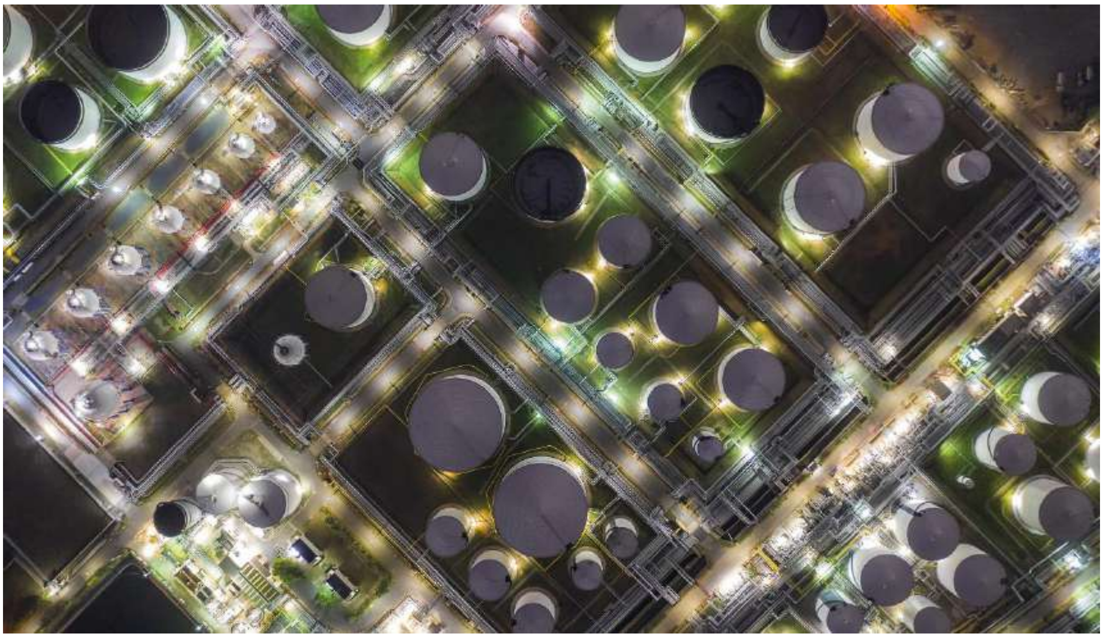
  Given the global energy uncertainty and price volatility concerns, Bangladesh can explore oil and POL product stockpiling.

  As per IEA guidelines, Bangladesh may aim to stockpile at least ~4 MT of crude oil, equivalent to ~52 days worth of crude oil storage[110].

Considering these advantages, Matarbari will act as a prime import terminal for oil imports for the country.

All crude oil required for 2030 capacity of ERL is expected to be met from Matarbari.

Further, in order to support 8-10 MTPA refinery capacity proposed at MIDI, additional oil import capacity may be needed in future.



[110] As per IEA guidelines of recommended stockpiling policy of "25% of annual crude import + 10% buffer", which is equivalent to 110% x (25% x 15 MTPA of crude oil refining capacity) = ~4.125 MTPA by 2041 (requiring ~50 tanks across ~22 acres, assuming 82,000 tons per tank of size 95 m dia and 15 m height)

7.3. LNG Imports

7.3.1. Demand outlook

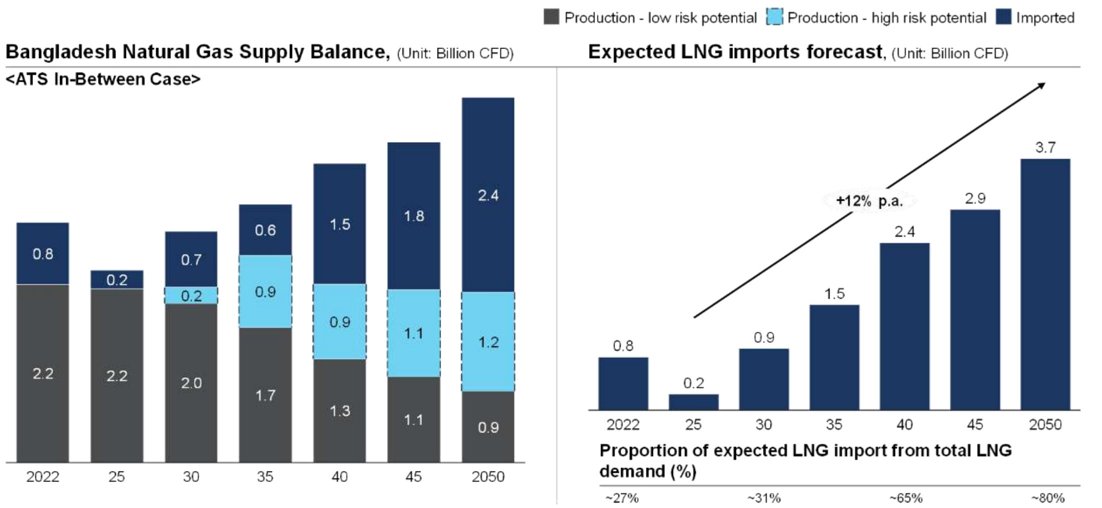
LNG demand in Bangladesh stands at ~3,000 mmcfd in FY22 and is expected to grow to 3,700 mmcfd by FY41. While at present, ~73% of total demand is met through domestic production, currently operational natural gas reserves are expected to slowly run out, decreasing from ~2,200 mmcfd today to 1,300 mmcfd by FY41.

Unless Bangladesh can tap into high-risk production potential, it will become increasingly import-dependent for LNG needs as its production capacity is gradually decreased.

Accounting for only the low-risk production potential, Bangladesh will require a total of 2,400 mmcfd of LNG import by 2041.

Note: Perspective on sustainability of Bangladesh's LNG import is discussed in previous section on Power generation.

Exhibit 62: Natural Gas Supply Balance in Bangladesh



LNG demand within MIDI

2 use-cases for LNG are likely within MIDI:
- Power generation
- Industrial feedstock

As discussed in previous section, gas power generation capacity at MIDI is slated at 8-13 GW. This translates to LNG requirement of ~950-1,540 mmcfd[111].

Further, a ~10% additional demand is expected from industrial hub.

Hence, intrinsic LNG demand at MIDI is expected to be ~1,000-~1,600 mmcfd (without considering blending with domestic gas).

[111] LNG required for each 1 GW plant = 1 GW * 24 hours * Plant load factor (85%) * 5.8 mmcf NG per GWh = 118 mmcfd NG

7.3.2. LNG import infrastructure

LNG import terminals in Bangladesh

At present, MIDI has LNG import capacity of 1,000 mmcfd operational across 2 FSRUs (500 mmcfd each). Both the FSRUs are leased out to private sector (Summit Group and Excelerate Energy) by Rupantarita Praktrik Gas Co. Ltd (RPGCL)[112] for 15 year period, set to expire in 2034.

These are also the only LNG import infrastructure in Bangladesh as of date. This capacity will be sufficient to handle LNG import demand of Bangladesh until 2030, beyond which, additional capacity will be required.

As per IEPMP, Payra is proposed as a potential location for another FSRU facility with up to 1,000 mmcfd capacity, between 2030-35.

Further, a 1,000 mmcfd land-based LNG terminal is proposed at MIDI as part of LUDP-2019 and Energy Sector Development Plan. EoI has been floated by Energy & Mineral Resources Division for the development of this terminal on BOT basis and several responses have been received, out of which 8 potential companies were shortlisted (as of Feb 2022). Further progress on tendering is awaited.

Evacuation pipelines

Bangladesh already has gas transmission pipeline network:

- 2 pipelines between Maheshkhali – Anowara (Chittagong) 13" dia and 42' dia (x 79 km) pipeline – Capacity ~1,350 mmcfd
- Chittagong to Dhaka

Further, gas pipeline from Payra to Dhaka is proposed.

LNG import infrastructure at MIDI

Considering the 2040 import demand (~2,400 mmcfd, going up to ~3,700 mmcfd by 2050) and the fact that existing FSRUs at MIDI may expire by 2034, MIDI is fit to take up a larger play for LNG imports with capacity of ~2,000 mmcfd[113] of import and regasification capacity, with target commissioning by 2035.

Out of this, ~1,000-~1,600 mmcfd (across different scenarios) will be used for MIDI's intrinsic demand (without considering blending with domestic gas).

FSRU vs Land-based Terminal

Determining which LNG terminal should be built can be based on various factors such as time-to-market, land availability, favorable meteorological conditions and long-term demand outlooks.

Basis initial analysis (subject to be validated by technical feasibility), it is assessed that land-based terminal may be a preferable option for setting-up LNG import facility at Matarbari due to multiple benefits including cost economics in long-term (across 30 year life), resistance to unfavorable meteorological changes (which impacts FSRUs at Matarbari) etc.

Exhibit 63: FSRU v/s Land-based LNG Import Terminal

	FSRU	Land-based Terminal
External sensitivities	FSRUs can't operate in unfavourable weather conditions and high tidal movement – reducing their efficiency	Not significant impact of weather and tidal conditions since vessel is docked at berth
Storage capacity	FSRUs storage capacity is limited and dependent on carrier size (~180,000m3), and must re-gasify immediately to prevent maxing out storage capacity	Can offer much higher storage capacities and hence receive larger LNG carriers for efficiency of operations

112 Subsidiary of PetroBangla

113 The LUDP-2019 and SDP, Energy proposes Land-based LNG terminal capacity of 1,000 mmcfd

	FSRU	Land-based Terminal
Resource requirement	**Land –** none for FSRU; Minor for pipeline connectivity **CAPEX –** ~350 M USD **Time for commissioning –** Approx. 30 months	**Land –** ~200 acres for 1,000 mmcfd **CAPEX –** ~750 M USD **Time for commissioning –** 3-5 Years
Operational costs	**Charter cost** – USD ~120,000-140,000 per day for charter cost (crew, insurance, maintenance) **Regasification process cost** - USD 90k – 100k per day	No charter cost **Regasification process cost –** USD 90k-100k per day
Asset life	10-15 years per lease term	20-30 years
Synergies with power generation	-	Boil-off gas from storage tanks can be utilized for power generation; Similarly, water heat can be used for LNG evaporation.
Favourable factors	- Short time to market / high short term demand - Uncertain long-term demand outlook or uncertain customer credibility - Unavailability of land for onshore facility	- Well defined long-term demand outlook - Unfavourable meteorological conditions - Large demand volume

7.3.3. LNG strategic storage

MIDI can also support emergency LNG stockpiling and hence support energy security for Bangladesh.

Given the global energy uncertainty and price volatility concerns on LNG, Bangladesh can explore LNG product stockpiling.

As per industry standards, LNG import storage is recommended at ~30-40 days of imports capacity:

- Regasification at MIDI - ~42,000 tons per day (against ~2,000 mmcfd NG import capacity[114])
- LNG storage capacity required - ~1.5-2 MTPA (30-40 days of national imports)

7.4. LPG Imports

LPG demand in Bangladesh was 1.4 MT in FY21 and entirely met by imports. Demand is expected to reach 2.5 MTPA in 2030, 5.0 MT in 2041, mostly driven by residential sector use.

Presently, LPG is imported from Middle East and is received at private jetties in Mongla / Sitakunda (north of Chittagong) in small barges due to draft constraints. This creates substantial cost addition to cost of LPG cylinder available in Bangladesh.

Matarbari can play a crucial role in reducing the cost of LPG in Bangladesh:

- Larger ships (>50,000 ton), as against 2,000-3,000 tons coming from Middle east currently, thus reducing cost of transport of LPG by USD 40-45 / ton
- Resultant reduction in cost of 12 Kg LPG cylinder by Taka ~50

Matarbari could be the prime port of call for large LPG tankers coming from Middle East, China, Malaysia.

LPG could then be further shipped from Matarbari to private jetties / Mongla Port in smaller barges / tankers for hinterland distribution.

The LPG import capacity at MIDI is hence pegged at ~3 MTPA by 2041 (~60% of demand).

Sizeable storage capacity will also be required to support the import terminal.

A downstream LPG bottling plant may also be developed at MIDI to cater to LPG demands in Chittagong and Cox's Bazar area.[115]

[114] 1 MTPA LNG = 131 mmcfd gas

[115] Since it is cheaper to transport LPG in large tankers rather than small cylinders, bottling plants prefer to be located closer to demand centres.

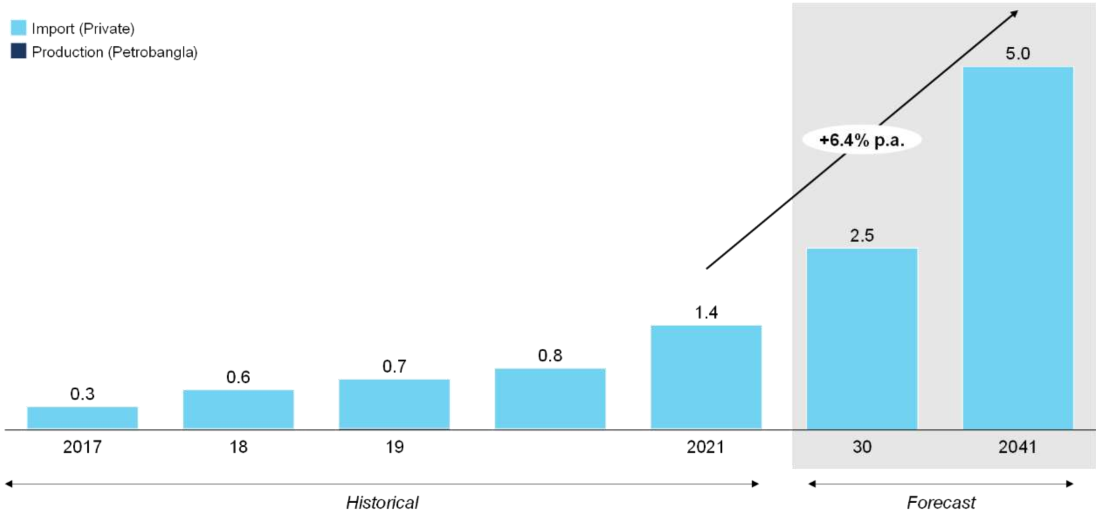
LPG import infrastructure at MIDI
A few proposals / plans for LPG terminal development are in public domain:

- Proposal by consortium of Japanese Marubeni Corporation, Swiss trading firm Vitol and local PowerCo International to build the 1 MTPA capacity LPG terminal. Current status of this proposal is unclear.
- Plans by a JV-led by the TK Group to develop a LPG import terminal at allotted land parcel in EZ-5.

Further scenario
Should MIDI have a modern refinery of 8-10 MTPA that can produce its own LPG, product slate may be configured to produce up to 1 MTPA of LPG.

This will further increase LPG competitiveness in Bangladesh.

Exhibit 64: LPG Supply Demand Outlook in Bangladesh (MTPA)

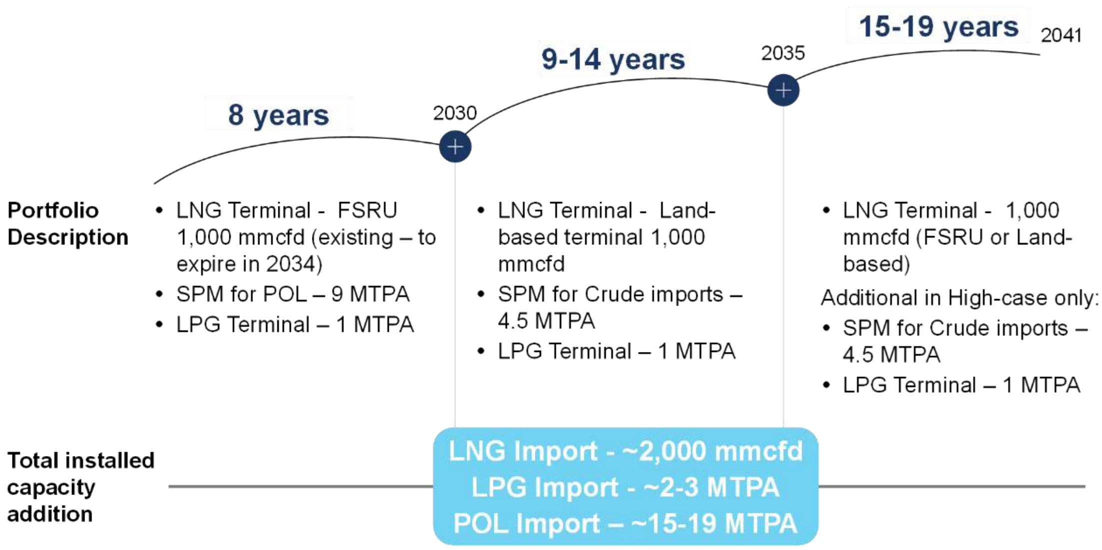


7.5. Ramp up of energy portfolio at MIDI

Across both scenarios, ramp up of installed capacity of power generation at MIDI in 2031 and 2036 is determined by mapping to following factors:

- MIDI's intrinsic demand
- Transmission infrastructure capacity available
- Progress of power generation projects at MIDI

Exhibit 65: Ramp-up of Energy at MIDI



Portfolio details:

	2030	2035	2041 – Risk-factored case	2041 – Base case
LPG (MTPA)				
Import terminal capacity - MIDI	1	2	2	3
Import demand - Bangladesh	2.5	3.4	5	5
Proportion of Bangladesh's demand - LPG	40%	58%	40%	60%
LNG (mmcfd)				
Import terminal capacity - MIDI	1000	1000	2000	2000
Out of which, LNG used for intrinsic demand at MIDI	*50*	*450*	*1000*	*1600*
Import demand - Bangladesh	900	1500	2400	2400
Proportion of Bangladesh's demand - LNG	111%	67%	83%	83%
POL Imports (MTPA)				
Import terminal capacity - MIDI - Crude Oil	4.5	10.5[116]	10.5	15[117]
Import terminal capacity - MIDI - POL products	4.5	4.5	4.5	4.5
Import demand - Bangladesh - POL Products (Excl. LPG)	14.8	18.4	23.8	23.8
Proportion of Bangladesh's demand - Crude & POL products (Excl. LPG)	61%	25%	63%	82%
Strategic Storage				
Storage tank capacity - MIDI - LPG (MTPA)	0.2	0.3	0.4	0.4
Storage tank capacity - MIDI - LNG (MTPA)	0.5	0.8	1.5	1.5
Storage tank capacity - MIDI - Crude Oil (MTPA)	1.2	2.9	2.9	4.1
Storage of Bangladesh's daily demand - LPG	~30-40 days of imports			
Storage of MIDI's daily demand - LNG	~30-40 days of imports			
Number of storage days for Bangladesh's total demand - Crude Oil	Approx. ~52 days worth of emergency crude stock-pile			

[116] ERL (4.5 MTPA) + TK Group refinery (6 MTPA)
[117] ERL (4.5 MTPA) + TK Group refinery (6 MTPA) + S Alam refinery (3-5 MTPA)

MIDI's Configuration

8. MIDI's Configuration

8.1. Risks

MIDI is a large and ambitious infrastructure project and may be subject to various risks which could impact its configuration and future potential. Mitigation to some of the risks is factored during development of this strategic vision. For other significant risks, a scenario analysis is considered to factor impact on future shape of MIDI.

8.1.1. Macro level risks

Country's overall growth

Bangladesh is currently undergoing a period of rapid economic development and has defined a vision to become a developed country by 2041. MIDI's vision is based on Bangladesh's growth aspirations as per the Perspective Plan and hence, MIDI will also be impacted in case there are country-level changes in overall growth trajectory of the economy.

Response:

- The risk has been factored by performing a conservative analysis and taking the lower projected growth rates (in-between case at 7.8% CAGR and IMF case at 6.3% CAGR) for Bangladesh as per IEPMP
- PP-2041 projections have not been considered in the growth analysis.
- A phased-development strategy will help counter the impact of mid-term growth variations and give opportunities to course-correct midway; further, a directional phasing plan has also been suggested in this report.

Relations with other countries

The Integrated Energy & Power Master Plan raises concerns on potential supply interruption of imported power caused by adverse relations with importing countries. Trade relations with countries can also impact supply chain of other key commodities required for production.

Risk relating to relations with countries involved in development projects should also be considered. Bilateral relationships may also impact projects which are dependent upon foreign funding – whether from sovereign donors or private sector.

Response:

- Risks associated with supply disruptions in power and raw material supply have been factored by undertaking scenario modelling in IEPMP.
- Further, MIDI's biggest contributor i.e. manufacturing sector, is de-risked due to its dependence upon investments from domestic investors in initial phase.
- Overall, Bangladesh has maintained great relationships with countries like Japan, India and with donors like ADB, World Bank etc. hence, risk of unavailability of development financing is low.

Priorities of government's actions and subsequent implications in policy directions

The government policy can have wide ranging impact on the economy, including the people and businesses. These policy measures are usually driven by global scenario and priorities of the government. For example: declaration of moratorium on coal power plants as a policy measure towards decarbonization impacted proposed development projects and called for major changes. Hence, any change in the political environment or policy could have a major impact and pose a risk to current positioning and vision of MIDI.

Response:

- As a response to the above risk, a phased-development strategy would prove beneficial as it would give opportunities to change configurations of the projects midway.

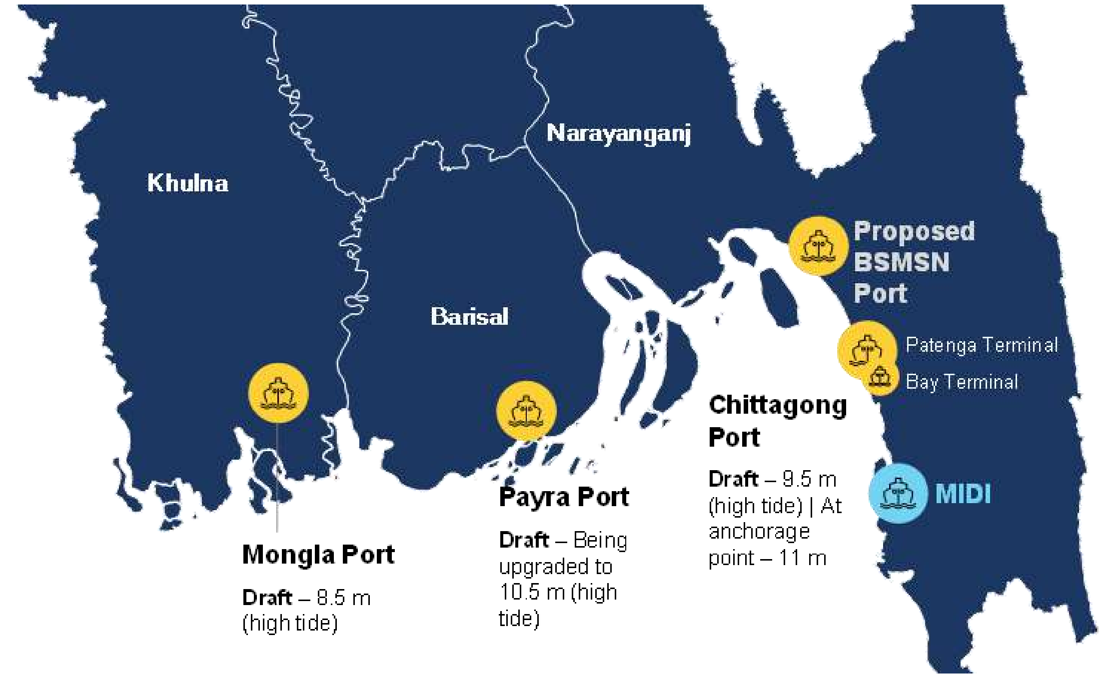
8.1.2. Deep-sea Port and Logistics hub

Excess port capacity in Bay of Bengal

Currently, Bangladesh has three major ports, namely Chittagong Port, Payra Port and Mongla Port. Further, Bangladesh's economic growth is being driven by major infrastructural projects like upcoming Bay and Patenga container terminals. Expansion plans of Payra port were also underway, until its recent curtailment.

Similar to MIDI, other economic zones like BMSN can also establish ports in future. Hence, there is a possibility of huge capacity expansion. Owing to this, Matarbari port faces a competitive risk from existing as well as upcoming ports in Bangladesh.

Exhibit 66: Major seaports in Bangladesh



As witnessed in growing economies like India, Malaysia, China, etc. ports tend to have over capacity i.e., total capacity across the ports in the country is usually higher than their total throughput. This over capacity is created to address future growth as well as any unforeseen capacity constraints due to factors project specific like financial risks, environmental risks, etc.

Case Study- West Coast, India

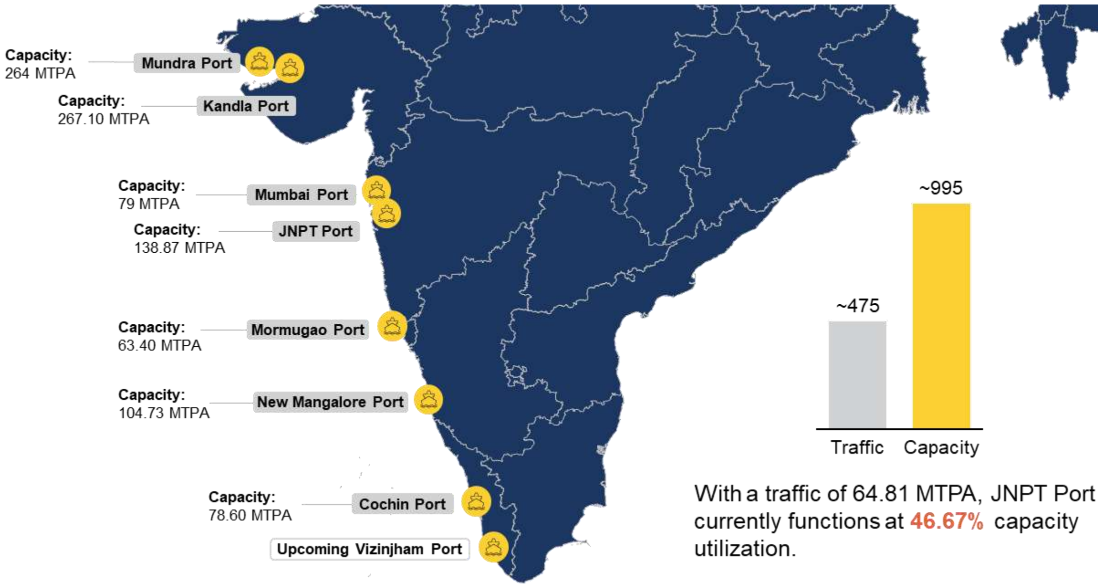
The Indian west coast stretches to nearly ~1,400 km and houses major ports including India's largest private port. These ports include Mundra Port, Kandla Port, JNPT, Cochin, Mangalore etc. New ports such as Vizhinjam are also being constructed. These ports experience over capacity and are currently ~50% utilized. As discussed, this over capacity exists to factor unforeseeable risks and to enable competition amongst ports to achieve economies of scale.

Response:

- In an event of proposed capacity expansion by establishment of Bay and Patenga terminal, bulk cargo at MIDI is highly unlikely to get affected. Since bulk cargo movement is cost sensitive, we have considered MIDI's share in total bulk traffic to be ~25%, largely limited to demand from catchment areas only like Chittagong and MIDI. Hence, the capacity risk only curtails to container traffic.

- Risk related to container traffic being affected by future capacity expansion has already been factored in one of the scenarios studied. Instead of projected 40-45% total container traffic, a share of ~36% has been considered as per the Port Feasibility report.

Exhibit 67: Major ports on Indian west coast



Demand risk for Port Traffic

MIDI's success as an economic hub depends on its port and efficiencies that can be derived from it. However, port's growth and success are driven and determined by its throughput. A variety of factors like competition from other ports, Bangladesh's overall traffic growth, etc. can impact port traffic at MIDI. Moreover, energy imports form a significant portion of port traffic. In case of high prices of LNG, crude, coal, etc. in future owing to unpredictability and volatility could reduce leading to a decline in port traffic.

Response:

- This risk is contingent on a variety of factors and has already been considered in scenario modelling.

8.1.3. Manufacturing hub

Competition from other parts of Bangladesh

Bangladesh houses various manufacturing centres in Dhaka, Chittagong and other regions. BSMSN (Bangabandhu Sheikh Mujib Shilpa Nagar) is one such large scale upcoming hub. It is being developed as smart city/ economic hub spread over ~33,800 acres, with focus on medium-heavy manufacturing industries.

Other new economic and export processing zones are also under development by BEZA / BEPZA. Details on these are attached in Annexure. BEZA's target to launch 100 economic zones by 2030 is one such example. Hence, MIDI faces competitive risk from existing and upcoming industrial developments.

Response:

However, it is worth noting that clear synergies exist between these hubs. There exists defined competitiveness for each hub in terms of sector fitment. A similar detailed analysis has been conducted for MIDI. Moreover, a conservative estimate has been undertaken on manufacturing targets for MIDI to incorporate any risk.
The same can be referred to in the manufacturing section. It is proposed that MIDI shall house specific sectors to

promote its coastal / deep seaport-led competitiveness and strengths.

For Bangladesh to achieve its set targets as per Vision 2041 and become a developed economy, a significantly larger manufacturing footprint will be required MIDI as an economic hub will contribute to the same. Hence, economic activities and developments across the country will complement each other to support Bangladesh's targets under its Vision 2041.

Success of export manufacturing at MIDI

Bangladesh's industrial policy and Perspective Plan 2041 lays emphasis on export-led manufacturing and export diversification. Keeping in line with the vision, MIDI could be a potential export hub for the country owing to its proximity to a deep seaport.

However, success of export manufacturing at MIDI is contingent upon Bangladesh's competitiveness in the region, which will further depend upon several factors like trade policies, labour laws, investment attraction, ease of doing business etc. Moreover, according to the Perspective Plan 2041, Bangladesh is expected to graduate from its LDC status (Least developed country) by 2024-2025. This would have a huge impact on Bangladesh's exports due to significant preference erosion in key markets. Also, many exemptions of WTO provisions would also no longer be available after 2024. Hence, Bangladesh would need to prepare counter for expected losses, and increase its competitiveness in the region.

Response:
The risk has been factored in the scenarios studied. Lower growth rates have been considered to perform the analysis across all components.

Discrete manufacturing at MIDI

Discrete manufacturing at MIDI, such as automobile and electronics assembly, is highly dependent on factors like labour costs and import tariffs. The labour costs vary among different areas within Bangladesh. Unavailability of skilled and cheap labour in MIDI could pose a competitive risk with other industrial clusters in Bangladesh.

Response:
Risk has been factored by adopting a phased approach and only introducing discrete manufacturing in medium-long term - post the establishment of MIDI as a port and heavy industrial hub.

8.1.4. Power & Energy hub related risk

Inadequate transmission infra

Power generation at MIDI would have to be supported by creation of transmission infra of commensurate capacity. Currently, a transmission line of 400 KVA has already been constructed up to Matarbari power plant. However, to support incremental power generation another 765 KVA line will have to be constructed.

Inability to construct the additional transmission line poses risk to additional power generation over and above the capacity of existing transmission line.

Response:
- Risk has been factored by adopting a phased approach to power generation capacity addition at MIDI
- Further, power generation scenarios have also been considered.

Import of power

Increase in feedstock prices and / or logistics costs could incentivize power imports as against domestic power generation from imported feedstock.

Response:
- Risk has been factored by considering varying power generation scenarios.

Import of POL products

Overcapacity of refining in South and Southeast Asia could make import of POL products more competitive as compared to domestic refining of imported crude.

Response:
- Risk has been factored by considering varying refining capacity scenarios.

8.1.5. Other risks

International risks

With a deep seaport, MIDI will serve as a gateway for large imports and exports. This poses international risk for MIDI like currency fluctuations, economic slowdown, trade barriers, acts of hostility, etc.

Integrated Development Risk

MIDI's development requires coordination between multiple departments because of interdependency between various components. Delays in land acquisition, construction etc. have potential to impact MIDI and create a risk for an integrated planned development.

Response:
- Detailed master planning and phased-development strategy will help counter such situations and give opportunities to course-correct midway
- Presence of an anchor authority would also be imperative in such situations.

Environmental Risk

Bangladesh's exposure to natural disasters poses an important risk. According to the World Bank report on Bangladesh's logistics scenario, MIDI region has tidal surge exposure. Moreover, the region is also prone to flash floods which possess a risk to MIDI's development.

Further, environmental impact risks, typically associated with industrial developments, like water / land / air / noise pollution, impact on flora & fauna will remain.

Response:
- MIDI will imbibe environmental protection measures as a strategy. Measures like volatile organic compounds (VOC) reduction, power cogeneration, move to new technologies like CCU, Hydrogen, recycling of industrial waste, effluent treatment and zero discharge policies will be needed.

Exhibit 68: MIDI's risk assessment

#	Risk factor	Degree of impact	Likelihood	Response
				🟢 - Low 🟡 - Medium 🔴 - High
Macro level risks				
1	Country's overall growth	🟡	🟢	Factored by taking lower projected growth rates for Bangladesh as per IEPMP.
2	Relations with other countries	🟡	🟢	Low likelihood since Bangladesh has good bilateral relationships; Also, manufacturing hub is de-risked in initial phase due to dependence on domestic investors.
3	Priorities of government's actions & subsequent policy implications	🟡	🟢	A phased-development strategy would prove beneficial as it would give opportunities to change configurations of the projects midway. A directional phasing plan has also been suggested in the report.
Deep-sea Port and Logistics hub related risks				
1	Excess port capacity in Bay of Bengal	🟢	🔴	Factored by undertaking scenario modelling. Instead of projected 40-45% total container traffic, a share of ~36% has been considered as per the Port Feasibility report. Further, energy imports have also been modelled under different scenarios.
2	Demand risk for port traffic	🔴	🟡	This risk is contingent on a variety of factors and has already been considered above.
Power & energy hub related risks				
1	Inadequate transmission infra	🔴	🟢	Risk has been factored by adopting a phased approach to power generation capacity addition at MIDI; further, varying power generation scenarios have also been considered.
2	Import of power	🟡	🟡	Risk has been factored by considering varying power generation scenarios in the analysis
3	Import of POL products	🟡	🟢	Risk has been factored by considering varying refining capacity scenarios in the analysis
Manufacturing hub related risks				
1	Competition from other parts of Bangladesh	🟢	🟡	A conservative estimate on manufacturing targets for MIDI incorporates this risk. Moreover, MIDI will complement the existing hubs by adding to the total manufacturing base of Bangladesh in its synergistic sectors.
2	Success of export manufacturing at MIDI	🔴	🟡	The risk has been factored in the scenarios studied.
3	Discrete manufacturing at MIDI	🔴	🟢	The risk has been factored in the scenarios studied by adopting a phased approach and only introducing discrete manufacturing in medium-long term – post the establishment of MIDI as a port and heavy industrial hub
Other risks				
1	International risks	🟢	🟢	A phased-development strategy will help counter such situations and give opportunities to course-correct midway
2	Integrated Development risk	🔴	🟡	Detailed master planning and phased-development strategy will help counter such situations and give opportunities to course-correct midway. Presence of an anchor agency would also be imperative in such situations.
3	Environmental risk	🟡	🔴	A technical feasibility study would be required to test and mitigate the risk.

8.2. MIDI Configuration

Basis the risks listed above, the configuration of MIDI has been analysed in the following 2 scenarios:

- **Risk-factored Case** – assuming MIDI is not able to achieve its inherent potential due to external risks.
- **Base Case** – MIDI is able to achieve its potential by meticulous implementation in a phased and integrated manner.

It must be noted that in both scenarios, MIDI could easily take a leading role to support growth of Bangladesh over next 20 years facilitated by port, power and energy and manufacturing activities.

Summary of scenarios considered for each pillar is as below:

- **Deep-sea port and logistics**
  Given its strategic advantages, MIDI would be a natural choice for EXIM trade in Bangladesh. Across scenarios, it is assessed that MIDI could address:
    - **Risk-factored Case** – 35-40% share of Bangladesh's container traffic in 2041.
    - **Base Case** – 40-45% share of Bangladesh's container traffic in 2041.

  However, same volume of dry bulk and breakbulk (~25% of Bangladesh's traffic) has been considered across both scenarios.

- **Power and Energy**
  MIDI's power scenarios are capped by multiple factors including transmission capacity, competitiveness viz-a-viz power imports, etc. Across the two scenarios, the proposed power generation for MIDI using a mix of coal, gas and solar is as below:
    - **Risk-factored Case** – ~10 GW (1.8 GW thermal + 8 GW gas + marginal solar).
    - **Base Case** – 15 GW[118] (1.8 GW thermal + 13 GW gas + marginal solar).

  In energy, different scenarios for crude and POL imports and refining capacities at MIDI have been considered.
    - **Risk-factored Case** – 2,000 mmcfd LNG + 2 MTPA LPG + 4.5 MTPA POL product imports + 10.5 MTPA crude imports (including 6 MTPA refinery at MIDI)
    - **Base Case** – 2,000 mmcfd LNG + 2 MTPA LPG + 4.5 MTPA POL product imports + 15 MTPA crude imports (including 10 MTPA refinery(ies) at MIDI)

- **Manufacturing**
  Given MIDI's competitiveness, two scenarios considered for manufacturing hub at MIDI are:
    - **Risk-factored Case** – MIDI is established as a manufacturing hub catering to demands of South Bangladesh, for bulk process industries with very limited export and discrete manufacturing opportunity.
    - **Base Case** – MIDI becomes a competitive hub for bulk process industries in mid-term. Further, in the long-long term, MIDI is also a suitable location for export-oriented and discrete manufacturing in segments like textiles, consumer durables, plastics, pharma, etc.

Basis these considerations, the next section summarizes the configuration for the three pillars of MIDI across both scenarios. In both scenarios, overland land (excluding EZ 1) has been consumed in full.

[118] ~50% of Chittagong zone installed capacity in 2041

8.2.1. Configuration across scenarios

Basis the analysis done for MIDI's three pillars and the 2 scenarios, the table below highlights suggested revised usage across logistics, power & energy and Manufacturing hub.

2041 CONFIGURATION[119]		Existing Land-use: **Area** (in acres)	Existing Land-use: **Description**	Base Case: **Area** (in acres)	Base Case: **Description**	Risk-factored Case: **Area** (in acres)	Risk-factored Case: **Description**
Port and Logistics Hub 1,670 acres	Bulk	1,670	16-38 MTPA (8 berths)	1,670	65-70 MTPA (8 berths)	1,670	65-70 MTPA (8 berths)
	Container		4.9 Mn TEUs (7 berths)		5.0-5.5 Mn TEUs (7 berths)		4.2-4.6 Mn TEUs (6 berths)
Power and Energy Hub ~10,300 acres	Power	9,900	~20 GW	6,300	15 GW • Gas – 4,500 • Coal – 1,000[120] • Solar – 800	4,600	10 GW • Gas – 2,800 • Coal – 1,000[121] • Solar – 800
	POL Refinery	-	-	750	~10 MTPA	500	~6 MTPA
	Energy Infra	400	• Crude – 4.5 MTPA (SPM + pipeline) • POL – 4.5 MTPA (SPM + pipeline) • LNG – 1,000 mmcfd land-based terminal • LPG – 1 MTPA terminal	400	• Crude – 15 MTPA (SPM + pipeline) • POL – 4.5 MTPA (SPM + pipeline) • LNG – 2,000 mmcfd land-based terminal / FSRU • LPG – 2 MTPA terminal • LNG and Crude storage tank farm – Suitable size	400	• Crude – 10.5 MTPA (SPM + pipeline) • POL – 4.5 MTPA (SPM + pipeline) • LNG – 2,000 mmcfd land-based terminal / FSRU • LPG – 2 MTPA terminal • LNG and Crude storage tank farm – Suitable size
		-	-	~2,900	Residential & social development + Future uses	~4,800	Residential & social development + Future uses
Manufacturing Hub ~8,400 acres	EZ2 to EZ8	8,400	• Multiple heavy and discrete industries • Residential township	~8,400	• Multiple heavy & discrete industries – 2,900 acres • Export oriented industries – 700 acres • Allied zone (other associated industries, future expansion) – 2,250 acres	~8,400	• Multiple heavy & discrete industries – 2,250 acres • Export oriented industries – 350 acres • Allied zone (other associated industries, future expansion) – 2,250 acres

[119] Future use and expansion lands not considered in impact analysis for MIDI
[120] For 1.2 GW CPGCBL Matarbari phase I + ~600-acre Orion plant (note – future expansion and soil stockpile area excluded from Matarbari Phase I, II to arrive at only Phase I area)
[121] For 1.2 GW CPGCBL Matarbari phase I + ~600-acre Orion plant (note – future expansion and soil stockpile area excluded from Matarbari Phase I, II to arrive at only Phase I area)

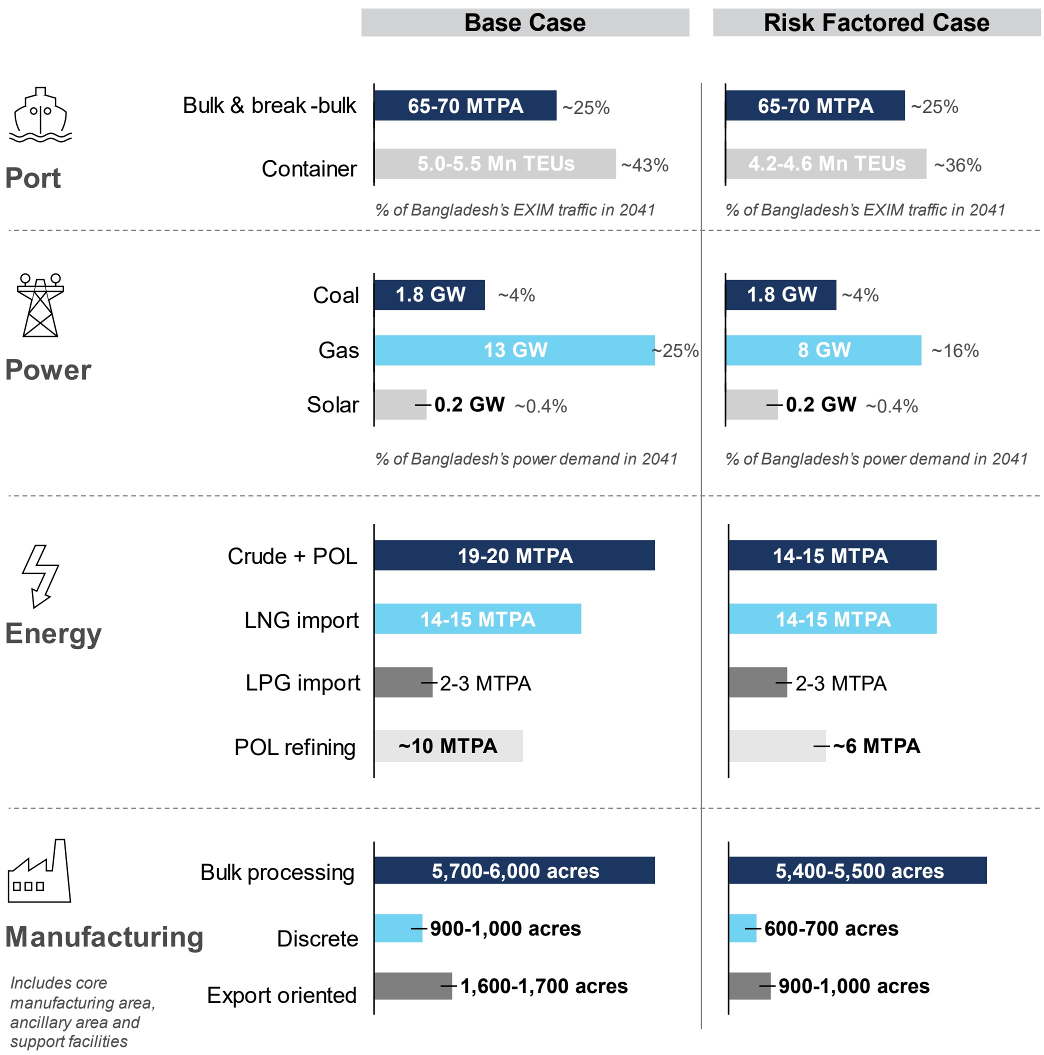
2041 CONFIGURATION[119]	**Existing Land-use**		**Base Case**		**Risk-factored Case**	
	Area (in acres)	**Description**	**Area** (in acres)	**Description**	**Area** (in acres)	**Description**
				• Logistics Park – 500 acres • Internal infrastructure & utilities – 2,100 acres		• Logistics Park – 500 acres • Internal infrastructure & utilities – 1,800 acres
					~1,300 acres	Residential & social development + Future uses
Residential and social infra -	-	Planned as part of EZs and Power Plants	-	~6.6 lakh residential community; Planned as part of Power Hub and Manufacturing Hub	-	~5.8 lakh residential community; Planned as part of Power Hub and Manufacturing Hub
Total	**~20,500**		**~20,500**		**~20,500**	
EZ 1 Sonadia	12,600	Eco-tourism	12,600	Eco-tourism	12,600	Eco-tourism
Total including Sonadia	**~33,000**		**~33,000**		**~33,000**	

Note

- Coal power generation area has only been considered for 1.2 GW CPGCBL Matarbari Phase I + ~600-acre Orion plant
- Future expansion and soil stockpile area have been excluded from combined Matarbari Phase I, II plan to arrive at only the Phase I area *(please refer to annexure for details)*
- The residual area earlier earmarked for Matarbari Phase II can now be utilized by CPGCBL / GoBD for other developmental purposes in MIDI
- In the table above, this residual area has been included under residential and social infra bucket

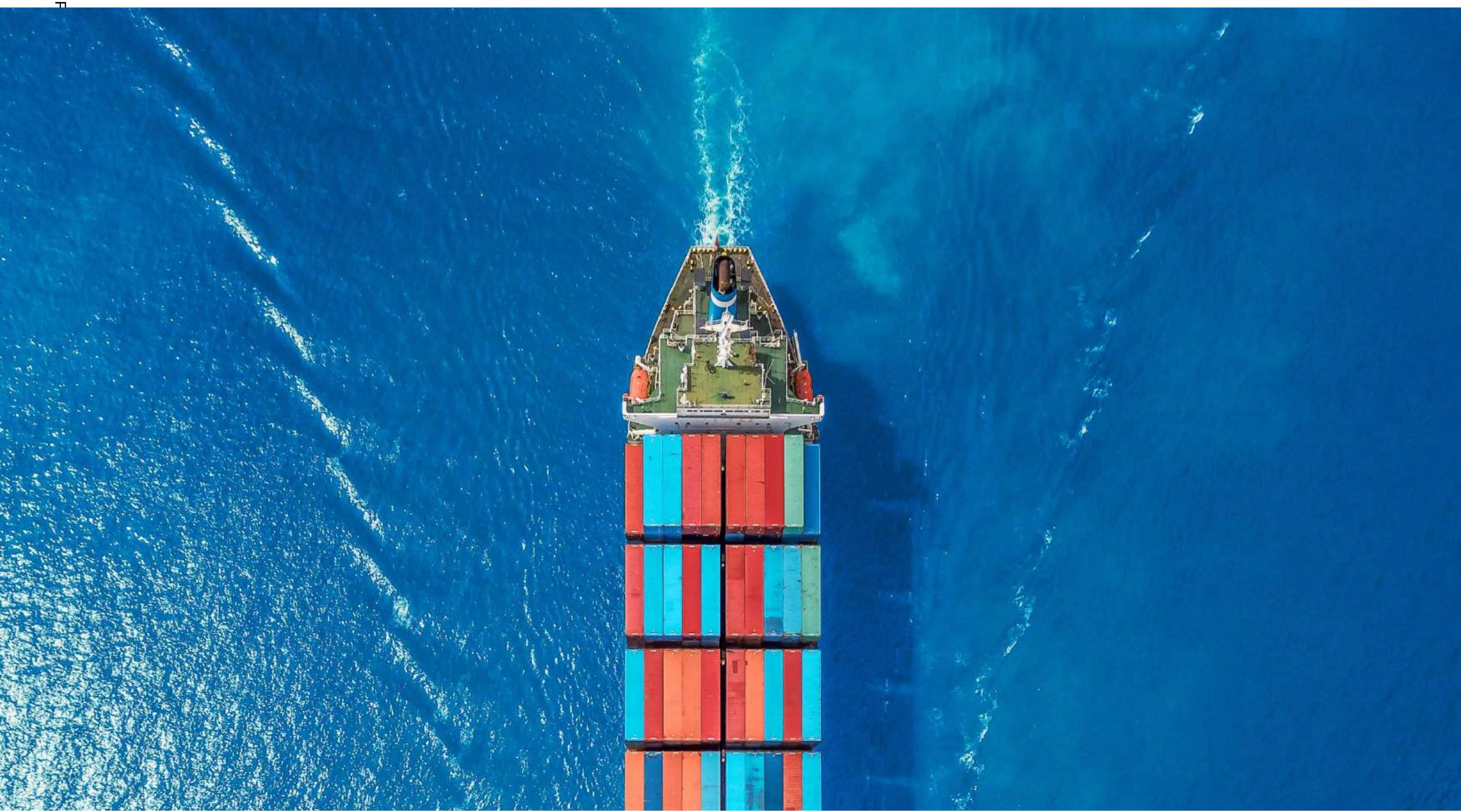
The following exhibit highlights scenarios for MIDI's 2041 configuration.

Exhibit 69: Scenarios for MIDI's 2041 configuration



++ Other supporting infrastructure including housing, supporting social infra, commercial/ retail infra, healthcare etc.

Impact



Key Messages

The intersection of MIDI's 3 pillars holds the potential to position it as a compelling economic development opportunity in realizing Bangladesh's Vision 2041.

If successfully implemented, the pillars can together create a powerful impact story for the country[122].

Contribution to GDP

USD 70-75 Bn – Direct Impact on GDP in 2041

USD ~150 Bn – Total (direct + indirect + induced) impact on GDP in 2041
Equivalent to ~6-6.3% of Bangladesh's GDP in 2041

Contribution to Employment[123]

~1.5 lakhs – Direct employment created at MIDI by 2041

~2.5 Mn – Direct + indirect impact employment created by 2041
Equivalent to >5.5% of Bangladesh's current labour force

Contribution to Investments[124]

USD ~60-65 Bn – Investment into MIDI over next 20 years

~USD 5 Bn – FDI into MIDI over next 20 years

Contribution to BoP and Exports[125]

USD ~17 Bn – Annual BoP savings by 2041, via import substitution and local value add at MIDI
Equivalent to ~31% of Bangladesh's 2022 imports

USD ~7-8 Bn – Annual exports from MIDI by 2041

MIDI, as a gateway for trade and investments into manufacturing, power generation and energy security, could be the engine for Bangladesh's economic expansion.

In fact, the preceding chapters showcase how MIDI could change the modus operandi across key economic sectors in the country.

MIDI could also potentially help Bangladesh create modern and state-of the-art new age urban ecosystem with a **population of ~5-7 lakh residents and sprawling social and civic infrastructure.**

Further, beyond the national boundaries, MIDI can provide deep seaport access to neighbouring land-locked areas like Northeast India and Bhutan. **MIDI could be a strategic project for boosting India-Bangladesh relationships through building regional connectivity for the Northeast Indian states.**

Thus, MIDI's impact could transcend the national boundaries and prominently place the Matarbari-Moheshkhali region on the map of Bay of Bengal and at the forefront of regional cooperation initiatives like BIMSTEC and FOIP.

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[122] Main section elaborates impact calculations for Base Case only
[123] For risk factored scenario: direct employment of ~1.2 lakh and total employment of ~1.8 Mn
[124] For risk factored scenario: total investment of USD 50-52 Bn of which USD 3.5-4 Bn FDI
[125] For risk factored scenario: USD 10-11 Bn annual BoP savings and USD 3-3.5 Bn exports

9. Impact Assessment

9.1. Pillar 1: Port and Logistics Hub

Matarbari port forms the pivot of an ambitious yet much needed logistics infrastructure augmentation & efficiency improvement programme for Bangladesh.

- As the only modern deep seaport in Bangladesh, Matarbari can enable significant cost and time savings for EXIM cargo.
  Matarbari will handle 66-68 MTPA of bulk & break-bulk traffic and 4.4-5.2 Mn TEUs container traffic by 2041.

  Cost benefits will accrue to different players across the system:
  - *Global shipping lines will save cost due to lesser wait time in trans-shipment and wait time at Chittagong port.*
  - *Shippers (manufacturers, traders) will save demurrage cost & inventory holding cost and ultimately benefit from cost savings passed on by shipping lines.*
  - *End-customers will benefit from cost savings passed on in retail price of end products.*

25-35% potential shipping cost savings will translate to ~USD 4 Bn[126] logistics cost savings for Bangladesh in 2041.

- This is expected to boost domestic manufacturing and make Bangladesh exports more competitive.
  Large scale and better operational efficiency at Matarbari port can reduce lead time for export commodities like RMG by 25-30 days.

- Deep-sea port will put Bangladesh on map of international shipping routes.
  Large mother vessels can directly come from Japan, China, USA, Europe, Middle East and other long-range origins, without need for trans-shipment.

- Logistics cost savings will ultimately reduce cost of essential commodities in Bangladesh.
  As an illustration, it is estimated that shipping cost savings can reduce cost of 12 kg LPG cylinder in Bangladesh by ~Taka 50.

Overall economic impact of deep seaport is detailed below:

Exhibit 70: Economic impact of Deep-sea Port & Logistics Hub

Impact of port		
Direct impact on GDP[127] – 2041	**1.6**[128]	*USD Bn*
Direct + indirect impact on GDP – 2041	**2.5**[129]	*USD Bn*
Total impact (Direct + Indirect + Induced) on GDP – 2041	**3.0**[129]	*USD Bn*
Direct jobs – 2041	**7,200**	*jobs*

[126] Basis commodity wise savings for all commodities to be handled at Matarbari port; considering historic freight escalation for maritime cargo
[127] Factors liquid cargo (LNG, Oil, LPG also)
[128] Effective per MT ton revenue in 2022 (assumed basis traffic and revenue of Chittagong Port in 2022) – ~USD 2.9 / MT | Effective per MT ton revenue in 2041 (escalated basis historical global port traffic growth) – ~USD 10 / MT | Total cargo handled at MIDI in 2041 – ~160 MTPA (Total bulk, breakbulk, liquid – ~103 MTPA | Imported containers (@15 tons / TEU) – 38 MTPA | Exported containers (@7.5 tons / TEU) – 19.5 MTPA)
[129] Using port linked output multipliers for Bangladesh

Total jobs (direct + indirect) – 2041	**1.8**	*lakh jobs*
Cumulative investment till 2041 (2022 prices)	**7.5**	*USD Bn*
Balance of Payment savings (logistics savings on EXIM) – 2041	**4.0**[126]	*USD Bn*

Investments into port

Port Investments (USD Mn, 2022 prices)			**7,500-7,600**
1	Port Phase I Stage I[130]	1 container berth + 1 multipurpose berth	**1,000**
2	Additional breakbulk and bulk berths over Phase I, Stage II and Phase II[131]	7 berths	**3,500**
3	Additional container berths over Phase I, Stage II and Phase II[132]	6 berths	**3,000**

9.2. Pillar 2: Manufacturing Hub

One of the most visible potential impacts of MIDI could be brought about by its manufacturing ecosystem, through:

- Development of **"one-of-the-firsts" in planned, modern, integrated port-led industrial ecosystems** which could host **some of the largest manufacturing plants** in the country.

- Providing **job opportunities** outside Dhaka and Chittagong
  Manufacturing hub will take up ~8,400 acres and will provide employment opportunities for ~1.5 L.

- **A fundamental change in the modus operandi of the manufacturing sector** in Bangladesh through **upstream & downstream value chain integration** and bringing **higher value-add** within the country to save value forex reserves.
  This will result in Balance of Payment savings equivalent to USD ~6 Bn by 2041.

- **Reduction in cost of goods** produced in Bangladesh.

- In the long-term, **attracting export-oriented discrete manufacturing** in select segments like consumer durables, pharma, plastics etc.
  This will result in Balance of Payment savings & exports worth USD ~3.9 Bn and USD ~7.6 Bn resp. by 2041.

Overall, MIDI is expected to directly contribute to ~10% of Bangladesh's manufacturing output by 2041[133].

Exhibit 71: Economic impact of Manufacturing Hub

Impact of manufacturing output		
Direct impact created on GDP - 2041	**52**	*USD Bn*
Direct + indirect impact - 2041	**95**	*USD Bn*
Total impact on GDP (Direct + Indirect + Induced) - 2041	**107**	*USD Bn*

[130] As per data received from JICA
[131] Estimated basis data received from JICA
[132] Estimated basis data received from JICA
[133] Bangladesh's GDP 2022 – USD 461 Bn | Real growth taken as per IMF estimates | Long term USD inflation @2.5% | Translates to ~USD 2.4 Bn GDP in 2041 | Share of industries in total GDP at 33-35%, as per PP 2041 | 65-70% of industries GDP is assumed to be contributed by manufacturing

Direct jobs created - 2041	**1.5**	*lakh jobs*
Total jobs created (Direct + Indirect) – 2041	**1**	*million jobs*
Cumulative investment attracted till 2041 (2022 prices)	**18.2**	*USD Bn*
Balance of Payment savings (due to import substitution) – 2041	**6.0**	*USD Bn*
Balance of Payment savings (due to exports) – 2041	**4.0**	*USD Bn*
Exports from MIDI – 2041	**7.6**	*USD Bn*
Land area occupied	**~8,400**	*acres*
Intrinsic demand for power generation hub at MIDI	**~3**	*GW*

Note: GDP impact and BOP savings have calculated under the following heads:
- **Direct impact** – Impact of manufacturing activities being directly undertaken at MIDI.
- **Indirect impact** – Ripple effect of direct impact on various levels across the respective value / supply chains of the direct impact activities.
- **Induced impact** – Impact beyond the manufacturing value chain, because of further spending due to improved socio-economic opportunities generated by direct & indirect activities.
- BoP savings (import substitution) will be equivalent to the difference between the price of imported product and cost of imported raw materials. Sectors within this category include Fertilizers, Plastics, Soya oil, 4W
- BoP impact (due to exports) will be equivalent to difference between export price of manufactured goods and cost of imported raw materials. All export sectors will be included in this category: Plastic products, Pharma, Synthetic fibres, yarn, Misc. exports (including ship building, etc.)

Phase wise impact of manufacturing hub

Exhibit 72: Computation on economic impact of Manufacturing Hub

		2030					2035					2041				
#	Sector / end product	Capacity[134]	Area (acres)[135]	Power – (MW)[136]	Investment (USD Mn, 2022 terms)[137]	Jobs[138]	Capacity	Area (acres)	Power – (MW)	Investment (USD Mn, 2022 terms)	Jobs	Capacity	Area (acres)	Power (MW)	Investment (USD Mn, 2022 terms)	Jobs
1	Steel	2	240	150	730	3,600	~7	830	525	2,500	12,500	11.8	1,400	900	4,300	21,500
2	Cement	4.5	70	30	280	1,400	7.5	120	50	470	2,400	10.5	170	70	650	3,400
3	Fertilizers – urea	0.7	140	40	580	3,100	0.7	140	40	580	3,100	0.7	140	40	600	3,100
4	Plastics & Polymers	0.5	50	10	740	1,800	0.9	90	20	1,400	3,400	1.3	130	30	2,000	5,000
5	Chemicals – paint (illustrative)	0.2	90	5	200	1,700	0.6	270	20	600	5,000	1.0	450	30	1,000	8,300
6.1	Food processing – edible oil (soya)	0.5	60	10	10	400	0.5	60	10	10	450	0.6	60	10	11	470
6.2	Food processing – sugar	0.7	40	10	10	1,100	0.8	40	10	10	1,100	0.8	40	10	11	1,200
6.3	Food processing – salt	0.8	40	10	10	1,100	0.8	40	10	10	1,200	0.8	40	10	11	1,200
7.1	Automobile – 2W	0.2	20	2	40	500	0.6	60	6	120	1,500	1.0	100	10	200	2,500
7.2	Automobile – 4W	-	-	-	-	-	0.1	50	5	110	1,250	0.1	100	10	230	2,500
8.1	Electronics park – consumer durables and electronics[139]	-	-	-	-	-		120	15	180	1,250		230	30	370	2,300
Export-processing																
1	Plastics / plastic products	-	-	-	-	-	0.2	50	20	400	1,500	0.4	100	40	800	3,000
2	Pharma	-	-	-	-	-	650	100	3	180	1,800	1300	200	10	380	3,600

[134] All capacities in MTPA except – automobiles, consumer durables & electronics (in million units p.a.) and pharma (in million formulations / dosages per annum)
[135] Basis per unit capacity area benchmarks from India & Bangladesh, Industrial and Economic Zones Sector Development Plan (IEZ-SDP) for MIDI and Feasibility Study of Infrastructure Development (Gas, Electricity and Communication) at Moheshkhali Economic Zone (Dhalghata) Infrastructure
[136] Basis per unit capacity power requirement benchmarks from India & Bangladesh; Industrial and Economic Zones Sector Development Plan (IEZ-SDP) for MIDI and Feasibility Study of Infrastructure Development (Gas, Electricity and Communication) at Moheshkhali Economic Zone (Dhalghata) Infrastructure
[137] Basis per unit capacity investment benchmarks from Bangladesh, India and other countries in South Asia
[138] Basis per unit area employment benchmarks from India & Bangladesh, Industrial and Economic Zones Sector Development Plan (IEZ-SDP) for MIDI and Feasibility Study of Infrastructure Development (Gas, Electricity and Communication) at Moheshkhali Economic Zone (Dhalghata) Infrastructure
[139] Includes ~2Mn consumer durables and ~10 Mn consumer electronics manufacturing capacity by 2041

#	Sector / end product	2030 Capacity[134]	2030 Area (acres)[135]	2030 Power – (MW)[136]	2030 Investment (USD Mn, 2022 terms)[137]	2030 Jobs[138]	2035 Capacity	2035 Area (acres)	2035 Power – (MW)	2035 Investment (USD Mn, 2022 terms)	2035 Jobs	2041 Capacity	2041 Area (acres)	2041 Power (MW)	2041 Investment (USD Mn, 2022 terms)	2041 Jobs
3	Synthetic fibers, yarn, textile	-	-	-	-	-	0.2	100	15	60	3,000	0.3	200	30	120	6,000
4	Misc (inc. shipbuilding, etc.)	-	-	-	-	-		100	3	250	2,500		200	10	510	5,000
Ancillary																
1	Multiple industries • Auto-components cluster • Plastic products for MIDI demand • Ammonia and urea associated chemicals, etc.		460	170	1,450	9,000		1,350	475	4,200	26,000		2,250	770	7,000	43,000
Logistics hub + support																
1	Logistics hub + support		900	40		6,200		1,600	70		11,000		2,600	100		18,200
			2,100	**470**	**4,000**	**30,000**		**5,100**	**1,300**	**11,100**	**79,000**		**8,400**	**2,100**	**18,200**	**1,30,000**

Overall GDP impact of manufacturing hub

#	Sector / end product	Dhaka Price (2022, USD / unit[140])	Raw material import cost (2022, USD / unit[141])	2041 Impact: Capacity[142] 2041	2041 Impact: Direct GDP (USD Mn, 2041)[143]	2041 Impact: Direct + indirect GDP (USD Mn, 2041)[144]	2041 Impact: Total (inc. induced) GDP[145] (USD Mn, 2041)
1	Steel	900	510	11.8	13,900	26,500	30,100
2	Cement	120	55	10.5	2,100	3,600	3,900
3	Fertilizers – urea	220	175	0.7	50	100	100
4	Plastics & Polymers	1,150	525	1.3	2,400	4,400	4,800

[140] All units as tons except - automobiles, consumer durables, smart phones (per unit electronic equipment) and pharma (per formulation / dosage)
[141] All units as tons except - automobiles, consumer durables, smart phones (per unit electronic equipment) and pharma (per formulation / dosage)
[142] All capacities in MTPA except – automobiles, consumer durables, smart phones (in million units p.a.) and pharma (in million formulations / dosages per annum)
[143] Direct GDP impact = local value add (i.e., Bangladesh price – Raw material import cost) x capacity being set up x commodity wise price escalation up to 2041
[144] Basis industry wise Input / Output multipliers for Bangladesh
[145] Basis industry wise Input / Output multipliers for Bangladesh

#	Sector / end product	Dhaka Price (2022, USD / unit[140])	Raw material import cost (2022, USD / unit[141])	2041 Impact Capacity[142] 2041	Direct GDP (USD Mn, 2041)[143]	Direct + indirect GDP (USD Mn, 2041)[144]	Total (inc. induced) GDP[145] (USD Mn, 2041)
5	Chemicals – paint (illustrative)	2,600	990	1.0	2,000	3,500	3,700
6.1	Food processing – edible oil (soya)	1,775	500	0.6	2,100	4,000	4,800
6.2	Food processing – sugar	1,050	500	0.8	1,300	2,500	3,000
6.3	Food processing – salt	300	0	0.8	700	1,300	1,600
7.1	Automobile – 2W	1,100	890	1.0	700	1,100	1,300
7.2	Automobile – 4W	23,800	19,000	0.1	1,400	2,100	2,500
8.1	Electronics – consumer durables[146]	350	280	2.0	400	700	900
8.2	Electronics – other electronics (inc. phones)[146]	125	100	10	800	1,500	1,700
Export-processing							
1	Plastics / plastic products	1,380	525	0.4	1,100	2,000	2,200
2	Pharma	0.61	0.37	1300	1,000	1,700	1,900
3	Synthetic fibers, yarn, textile	1,200	525	0.3	700	1,300	1,400
4	Misc. (inc. shipbuilding, etc.)	-	-	-	1,100	2,000	2,100
Ancillary							
1	Multiple industries • Auto-components cluster • Plastic products for MIDI demand • Ammonia and urea associated chemicals, etc.	-	-		20,000	36,700	41,500
					52,000	**95,000**	**107,500**

[146] Includes ~2Mn consumer durables and ~10 Mn consumer electronics manufacturing capacity by 2041

BoP Savings due to Import Substitution

#	Sector / end product[147]	Finished product import cost[148] (2022, USD / unit)	Raw material import cost (2022, USD / unit)	2041 Impact Capacity[149] 2041	2041 Impact BoP (USD Mn, 2041)[150]
3	Fertilizers – Urea	280	175	0.7	100
4	Plastics & Polymers	1,050	525	1.3	2,000
6.1	Food processing – edible oil (soya)[151]	1,775	500	0.6	2,100
7.2	Automobile – 4W	23,800	19,000	0.1	1,400
					5,700

Exports and corresponding BoP Savings

#	Sector / end product	Export price (2022, USD / unit[152])	Raw material import cost (2022, USD / unit[153])	2041 Impact Capacity[154] 2041	2041 Impact Exports (USD Mn, 2041)	2041 Impact BoP (USD Mn, 2041)[155]
1	Plastics / plastic products	1,380	525	0.7	1,800	1,100
2	Pharma	0.61	0.37	1.3	2,400	1,000
3	Synthetic fibers, yarn, textile	1,200	525	0.6	1,200	700
4	Misc. (inc. shipbuilding, etc.)	-	-	0.1	2,200	1,100
					7,600	**3,900**

[147] All units as tons except - automobiles, consumer durables, smart phones (per unit electronic equipment) and pharma (per formulation / dosage)
[148] Cost / price of finished goods / raw material taken as either FOB + CIF cost till Chittagong or CFR price at Chittagong, as sourced through industry interactions and public sources.
[149] All capacities in MTPA except – automobiles, consumer durables, smart phones (in million units p.a.) and pharma (in million formulations / dosages per annum)
[150] BoP savings = Foreign exchange saved (i.e., Finished import cost – RM import cost) x capacity being set up x commodity wise price escalation up to 2041
[151] Also includes minor sugar
[152] All units as tons except - automobiles, consumer durables, smart phones (per unit electronic equipment) and pharma (per formulation / dosage)
[153] All units as tons except - automobiles, consumer durables, smart phones (per unit electronic equipment) and pharma (per formulation / dosage)
[154] All capacities in MTPA except – automobiles, consumer durables, smart phones (in million units p.a.) and pharma (in million formulations / dosages per annum)
[155] BoP savings = Foreign exchange earned (i.e., international market price – RM import cost) x capacity being set up x commodity wise price escalation up to 2041

9.3. Pillar 3: Power Generation and Energy Hub

Positioning of MIDI as a Power & Energy hub has 3 sub-components:

- MIDI as a **power generation hub**
- **MIDI as an energy import hub**
- MIDI as a **refining and petrochemical hub**

Overall, the 3 components add to a strong energy security narrative for Bangladesh.

The economic impact of the hub is outlined below.

Exhibit 73: Economic impact of Power Generation & Energy Hub

Impact of power generation and energy hub		
Direct impact on GDP[156] – 2041	**13.7**	*USD Bn*
Power generation[157]	*13.3*	*USD Bn*
Refinery[158]	*0.4*	*USD Bn*
Direct + indirect impact on GDP – 2041	**21.2**	*USD Bn*
Power generation	*20.5*	*USD Bn*
Refinery	*0.7*	*USD Bn*
Total impact (Direct + Indirect + Induced) on GDP – 2041	**25.6**[159]	*USD Bn*
Power generation	*24.8*	*USD Bn*
Refinery	*0.8*	*USD Bn*
Direct jobs – 2041	**14,000**	*Jobs*
Power generation	*3,000*	*Jobs*
Refinery	*11,000*	*Jobs*
Total jobs (Direct + Indirect) – 2041	**8.3**	lakh jobs
Power generation	*7.7*	*lakh jobs*
Refinery	*0.6*	*lakh jobs*
Cumulative investment (2022 prices)	**27.7**	*USD Bn*
Power generation	*16.8*	*USD Bn*
Energy infra (LNG, LPG terminals, FSRU, SPMs, transmission and gas pipeline)	*3.4*	*USD Bn*
Refinery	*7.5*	*USD Bn*
Balance of Payment savings (logistics savings on EXIM) – 2041	**3.4**	*USD Bn*
Refinery[158]	*3.4*	*USD Bn*

Power generation – Investments

	Power & Energy generation:	**Capacity (GW, 2041)**	**Development cost (USD Mn; 2022 prices)**
1	Gas[160]	13	9,500
2	Coal - Matarbari (including port side infra)[161]	1.2	6,200
3	Coal - Orion[162]	0.6	900
4	Solar[163]	0.2	80
	TOTAL	**15**	**16,800**

[156] GDP impact of energy imports is captured in Deep-sea Port & Logistics
[157] Power generation setup at MIDI will be able to produce ~1.08 lakh GWH of power in 2041 – translating into USD 13.3 Bn of revenue in 2041 | Computed at USD 0.07-0.075 / KWh current average rate escalated at 3% p.a. (historic escalation over FY13-FY21)
[158] Only captures impact of sale of POL products. Petrochemical impact captured under polymers and chemicals heads under manufacturing
[159] Using industry wise output multipliers for Bangladesh
[160] Estimates basis similar projects in other developing nations in Asia
[161] Actual investment data received from JICA – also includes cost of port channel and port access road
[162] Estimates basis similar projects in other developing nations in Asia
[163] Estimates basis similar projects in other developing nations in Asia

BoP savings at Refinery[158]

		POL Import price (2022, USD / ton)[164]	Domestic market sales price (2022, USD / ton)[165]	Crude import cost (2022, USD / unit)	2041 Impact Capacity 2041	GDP (USD Mn, 2041)[166]	BoP (USD Mn, 2041)[167]
1	Refining complex at MIDI	930	680	650	10	375	3,400

9.4. Supporting Infrastructure

9.4.1. Core Infrastructure

It has been proposed to connect MIDI region via a port access road and access railway. **Cumulatively this will require an investment of ~USD 2.8 Bn**[168] **at 2022 prices** of which access road and other major connecting roads are estimated at USD 1.3 Bn and rail is estimated at USD 1.5 Bn.

Hence, total supporting core infra investment into MIDI is **~USD 4-5 Bn**

- Access road + other major roads – USD ~1.3 Bn
- Access rail from Chakaria (26 km) – USD ~1.5 Bn
- Land development cost – USD 1.1 Bn[169]

9.4.2. Residential and Social Infrastructure

Total direct employment of ~1.5 lakh at MIDI will translate to a local population of ~5-7 lakhs. Additionally, a floating population of 10-15 lakhs will also be working at MIDI.

This population will need residential housing and accompanying social infra.

Broad estimates[170] for social infra development include:

- ~1.2 lakh dwelling units
- ~3,000 keys hotels
- ~100 schools + 5 colleges + 2 higher education institutes
- ~1,000 hospital beds under secondary + tertiary care
- ++ primary healthcare, markets, parks, sports centres, etc.

A total of ~USD 5-6 Bn has been estimated for creation of residential township and social infra at MIDI.

9.4.3. Eco-tourism zone at Sonadia

Apart from the core components, an eco-tourism zone is also proposed at EZ 1 at Sonadia. As per "Feasibility Study for the Economic Zone Site in Sonadia, Moheshkhali" impact of proposed zone at Sonadia in 2041 is as follows:

Sonadia Eco Tourism zone		
Direct impact created on GDP - 2041	870	*USD mn*
Total impact on GDP (direct + indirect) - 2041	1,660	*USD mn*
Direct jobs – 2041	450	*jobs*
Total jobs (direct + indirect) – 2041	540	*jobs*

[164] Blended price across commodities
[165] Blended price across commodities
[166] Direct GDP impact = local value add (i.e., Bangladesh price – RM import cost) x capacity being set up x commodity wise price escalation up to 2041
[167] BoP savings = Foreign exchange earned (i.e., international market price – RM import cost) x capacity being set up x commodity wise price escalation up to 2041
[168] Basis data gathered from relevant GoBD departments and benchmarks for similar projects
[169] USD 0.05 Mn per acre across ~21,000 acres of MIDI rea
[170] Computed as per urban planning norms

9.5. Cumulative Economic Impact

Cumulative impact across components of MIDI is summarized below:

Total envisioned investment of USD 60-65 Bn over next 20 years

- Government investment of USD ~15-16 Bn
- Private investment of USD ~47-48 Bn; of which ~10% or USD 4.8 Bn is targeted FDI investment

Total GDP impact of USD ~150 Bn (~6.3% of Bangladesh's GDP) in 2041

- Direct GDP impact of USD ~70-75 Bn

Further, total ~1.5 lakh direct jobs and ~2.5 Mn direct + indirect jobs will be created by 2041.

Further, MIDI will be essential pre-requite for long term creation and sustainability of Cox's Bazar's regional economy

- Development of first greenfield integrated port-industrial-energy-tourism ecosystem in South Bangladesh
- Synergies with upcoming development including Cox's Bazar International Airport
- 1.5X the current tourist footfall in Cox's Bazar
- Cheaper logistics costs up to Cox Bazar compared to existing manufacturing hubs, translating to lower landed cost

Exhibit 74: Cumulative Impact of MIDI

Investment brought to Bangladesh (2022 prices)	USD Mn
Investment – Port & Logistics	7,500
Investment - Power & energy	28,000
Investment - Manufacturing	18,200
Investment – Supporting physical infrastructure	4,300
Investment – Social Infrastructure (Inclu. Sonadia)	5,700
TOTAL	USD 63-64 Bn

GDP (USD Bn, 2041)	Direct Impact	Direct + Indirect Impact	Total Impact
Port & Logistics	1.6	2.5	3.0
Power & Energy	13.7	21.2	25.6
Manufacturing	51.8	95.1	107.6
Annualized GDP impact of investment[171]	5.2	9.8	11.9
Sonadia	0.9	1.7	1.7
TOTAL	73	130	150

9.6. Impact on regional development of North Eastern India and Bhutan

Once completed, MIDI would be the first deep seaport in the Bay of Bengal north of the already existing Paradip port. Hence, MIDI has the potential to not only cater to Bangladesh traffic but also provide deep seaport services to East and Northeast India, and Bhutan. Hence, the vision of MIDI extends much beyond its impact on the economy of Bangladesh, to a regional development connecting erstwhile hinterland to major shipping routes and bringing the entire region to the forefront of BIMSTEC agglomeration.

9.6.1. Introduction to North Eastern Region, India

India's North Eastern Region comprises 8 Indian states (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura) sharing border with

[171] Annualized investment escalated to 2041 prices

China, Bangladesh, Bhutan and Myanmar. 4 of the 8 states namely, Assam, Meghalaya, Mizoram and Tripura share a border with Bangladesh.

North Eastern Region houses ~9% of India's population but contributes only 3-4% of the national GDP. While currently underutilized, North Eastern Region's geostrategic location coupled with vast natural resource and agri-commodity base lends the region an inherent advantage to become a leading trade hub. However, to achieve its true potential, the region requires significant investments in infrastructure and logistics.

9.6.2. North Eastern Region, India – Logistics Constraints

Being a hilly and border geography, North Eastern Region faces numerous logistics impediments:

- Currently, almost all land-based trade to and from the region is facilitated through a narrow corridor passing through the state of West Bengal ("Siliguri Corridor" / "Chicken Neck Corridor")
- Further, large part of the North Eastern Region comprises hilly terrain, making costly road transportation the predominant mode of movement for the North Eastern Region.
- Chicken neck corridor coupled with the hilly terrain in the North Eastern Region, leads to slow and costly movement of cargo to and from the region.

In this context, utilization of inland waterway transport and road networks passing through Bangladesh can significantly contribute to logistics cost and time savings for the North Eastern Region cargo.

9.6.3. North Eastern Region, India – Trade Potential

Outbound Cargo

The North Eastern Region of India possesses several geographic advantages including climatic conditions, soil fertility and biodiversity, making it a hub for horticulture cultivation. The region has significant surplus in major fruits and vegetables including banana, potato, cabbage, pineapple, orange, tomato, jack fruit, cauliflower, brinjal.

Further, **Assam contributes to >50% of India's tea production** and is among the largest tea producers of the world. Additionally, region also produces other agro-food products including ginger, sesamum seeds, etc.

Government of India and various state Governments in the North Eastern Region are establishing commodity specific agro parks for storage, processing and trade of these products. Hence, the region's horticultural and agri surplus can be processed and transported to various regions in India or be directly exported to leading export destinations if **the North Eastern Region can get access to modern and state of the art logistics infrastructure.**

Note – other outbound cargo from the North Eastern Region also includes clinker, rubber, etc.

Inbound Cargo

The North Eastern Region receives ~18.5 MTPA of inbound cargo comprising food grains, construction materials, machinery and equipment, and household consumption goods (FY18). Currently, almost all inbound cargo from various origins in India traverses via road / rail passing thorough Siliguri to reach the consumption centers.

Hence, logistics connectivity augmentation has a huge potential to improve both the time and cost of incoming cargo.

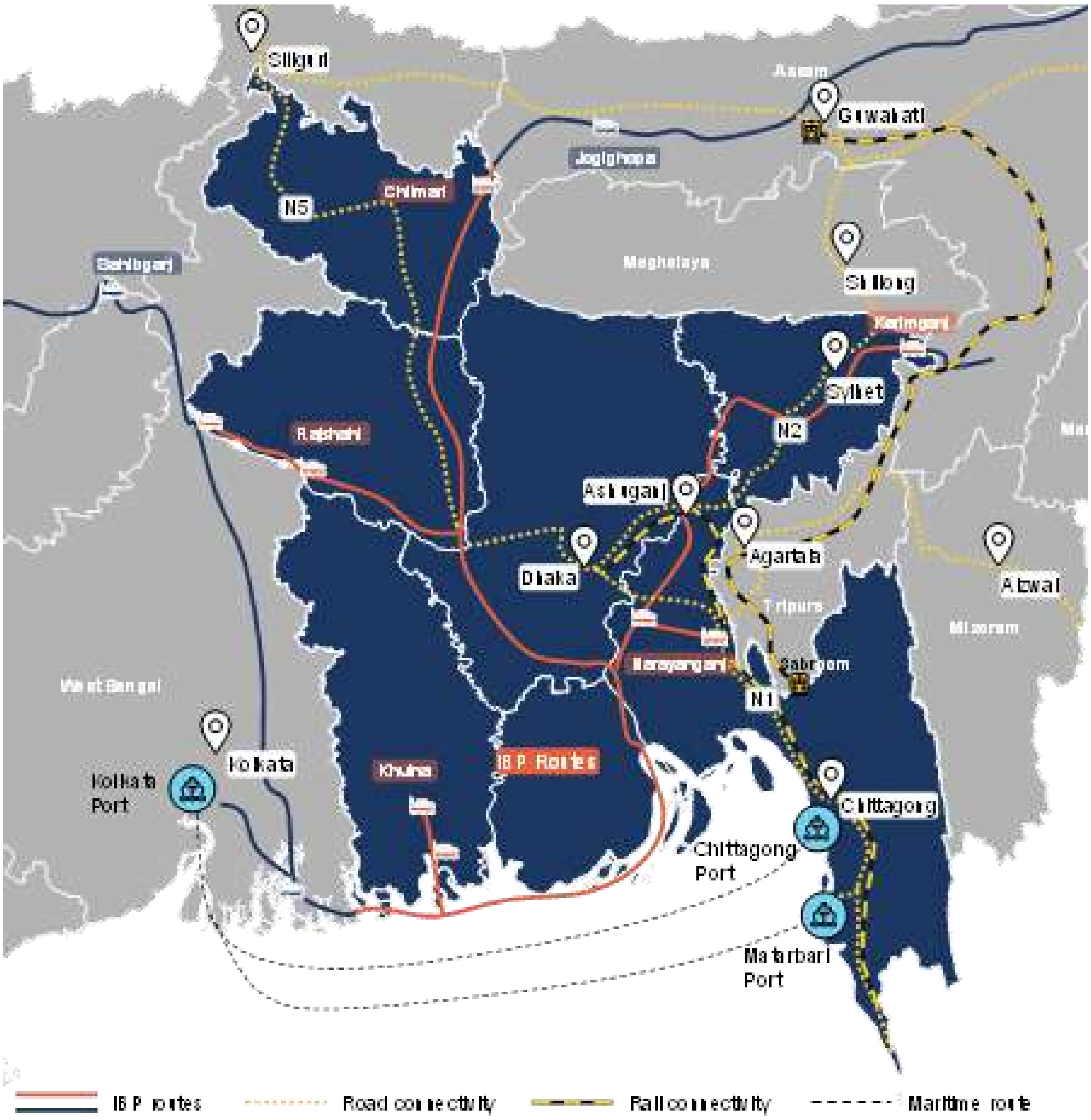
Role of Bangladesh in connectivity to India's North Eastern Region

Transport of cargo to North Eastern Region, via Bangladesh is the logistically optimal solution. For instance – Agartala via Guwahati is 1,650 km from Kolkata by road, while the distance via waterways (through Bangladesh) is <900 km.

To leverage this, GoI and GoBD have entered into various bipartite agreements.

- **Indo-Bangladesh Protocol (IBP)** allows Indian inland waterway vessels to traverse the notified waterway routes in Bangladesh.
- India has used Bangladesh waterways in the past to transport heavy machinery and equipment for the Numaligarh refinery in Assam and the Lower Subansiri hydroelectric project in Arunachal Pradesh.
- In September 2020, trial run was completed for transport of goods to Tripura via Bangladesh roads.
- In 2015, India tried transport of LPG cylinder to Tripura from Kolkata via river till Ashuganj in Bangladesh, after which tankers went by road till Tripura.
- To further, strengthen logistics infra, a multi-modal transport hub is being constructed in Tripura's Sabroom – sharing land border with Bangladesh and ~70 km from Chittagong.
- India and Bangladesh have also entered into a MoU for use of Chittagong ang Mongla port for trans-shipment to and from the North Eastern Region.

Exhibit 75: Connectivity between Bangladesh and India's North Eastern Region



9.6.4. Role of MIDI in connectivity to India's North Eastern Region

Currently, most of the international sea-borne cargo to / from the North Eastern Region is serviced by Kolkata port. Given large distance up to the Indian port(s), the first mile **logistics costs act as a major hinderance in growth of EXIM trade from the North Eastern Region**.

Matarbari Port can help reduce the hinterland as well as per shipping costs for North Eastern Region. Being a deep seaport, MIDI has the ability to directly connect the North Eastern Region to all major shipping lines and shipping routes.

Summarily, Matarbari Port can be more competitive for EXIM cargo to/from North Eastern Region of India, against both Kolkata and Chittagong region. The tables below provide logistics cost comparison**:**

- ~70% lower hinterland transport cost of goods to/from North Eastern Region till Matarbari Port (as against till Kolkata Port).
- 20-25% lower cost to hinterland ship transport from North Eastern Region via Matarbari Port (as against Chittagong Port).

In addition to North Eastern Region of India, Matarbari Port also has the potential to cater to Bhutan, which is a landlocked country between China and Northeast India[172]**.** Bhutan has already signed multilateral agreements with Bangladesh and India to use their ports for meeting its EXIM needs.

Exhibit 76: Potential Logistics Cost from Matarbari to/from North Eastern Region, India

Origin	Destination (Port)	Mode	Distance (km)	Cost / ton[173] (USD)
Agartala	Kolkata	Road - current	1,550[174]	**85-90**
Agartala	Matarbari	Road	300[175]	**20-25**
Agartala	Matarbari	Waterways	78 km road (Agartala to Gomati) + 400 waterways (from Gomati to Matarbari)	**10-12**
Agartala	Matarbari	Rail	130 km road (Agartala to Sabroom) + 180 km rail (Sabroom to Matarbari)[176]	**12-14**
Guwahati	Kolkata	Road - current	1,050[177]	**58-62**
Guwahati	Matarbari	Road	840 km (via Tripura and the Bangladesh)[178]	**45-50**
Guwahati	Matarbari	Waterways	First mile road + 800 km waterways (Guwahati to Matarbari)[179]	**15-20**

Note – Assuming Sabroom's connectivity to Dhaka Chittagong rail line in future for seamless movement of goods via rail (currently not planned)

Origin	Destination	Via	Up to port (USD / ton)	Shipping Costs (USD / ton)	Total[180] (USD / ton)
Agartala	South-east Asia	Chittagong	8-10	18-20	**26-30**
Agartala	South-east Asia	Matarbari	10-12	11-12	**21-25**

[172] Economics of transportation from Bhutan is similar to transportation from Guwahati
[173] Only freight transportation costs – does not handling charges, regulatory charges, etc.
[174] USD 0.056 /ton km basis primary interactions and research
[175] USD 0.075 /ton km for trips shorter than 500 km
[176] USD 0.01875 / ton km for rail and USD 0.075 / ton km for trips shorter than 500 km
[177] USD 0.056/ ton km basis primary interactions and research
[178] USD 0.056/ ton km basis primary interactions and research
[179] USD 0.0156 / ton km for IWT and USD 5/ ton min first mile
[180] Only freight transportation costs – does not handling charges, regulatory charges, etc.

10. Roadmap to 2041

The preceding chapters in this report have laid down the 2041 vision for MIDI, translated into strategic pillars, their respective blueprint and potential impact. This chapter lays down the roadmap for implementation of the blueprint and realization of impact.

10.1. Pathway to 2041

MIDI's evolution will be spread over a growth period of **next 18-20 years,** wherein MIDI will take different growth positions along its development journey.

Period 1: Incubation Period (Till 2030)

Position: This period is going to see anchor investments in MIDI across sectors – Ports, Manufacturing and Power, establishing a proof-of concept by 2030, which can propel further investments.

By the end of 20230, MIDI will have already achieved a sizeable share of Bangladesh's energy imports, along with operations of one of the largest coal power plants in the country. The port Phase 1 / Stage 1 would start operations, along with some investments by private sector.

Critical milestone / Inflexion Point: This period will be marked by readiness of some of the most fundamental projects to MIDI – the Port Phase 1 / Stage 1 (including Port Access Road till Chakaria), which are delayed / not commenced so far. Also, land development of EZ 4 and EZ 5 will be needed.

Hence, we think 2027 could be an inflexion point to continue interest and create a growth momentum for private investments.

Any delay in commissioning of port (or the port access road) will theoretically push rest of the project by that much delay on private investments.

Period 2: Ecosystem Development Period (2030-2035)

MIDI's envisioned shape and programme will start emerging in the beginning of this period, when investments made in period 1 will start operations. The trigger for this phase is going to be proof-of-concept established by investments in the Incubation period.

This period will see investments in downstream value chain of anchor investments, as well as new anchor investments in new sectors.

By the end of 2035, MIDI Phase 2 / Stage 1 would have operationalized, along with more investments in power generation and a significant traction on private manufacturing investments. This will transition MIDI from an energy & power heavy position in Period 1 to a position where port & manufacturing will take a lead role.

The Pathway to 2041 could be mapped into 3 growth periods, marked by 2 clear inflexion points.

Critical milestone / Inflexion Point: By end of this period, it is assumed that most of investments in infrastructure at MIDI will be completed and MIDI will emerge as a world-class ecosystem having already established itself as a port-led manufacturing hub and power & energy hub.

Further, by 2035, it is also expected that Bangladesh will realize its larger export-potential in other sectors by improving its export-competitiveness.

Period 3: Diversification and Expansion Period

This period will see MIDI brand having established itself as a port-led economic ecosystem with 3 strong pillars – Port & Logistics, EXIM Manufacturing and Energy Imports & Power.

Backward and forward integration across the manufacturing value chain will be the driving force in this period, pushing growth of port and power ecosystems.

Growth profile of MIDI in this period can vary depending on the scenario which gets traced.

In base case, propelled by Bangladesh's strengths in exports and its own strong ecosystem, MIDI could also take-up an export-led manufacturing position in this period.

Alternately, MIDI's manufacturing growth can take a slightly slower growth path in this period, largely dependent upon diversification & growth in existing bulk industries.

Exhibit 77: MIDI's Pathway to 2041

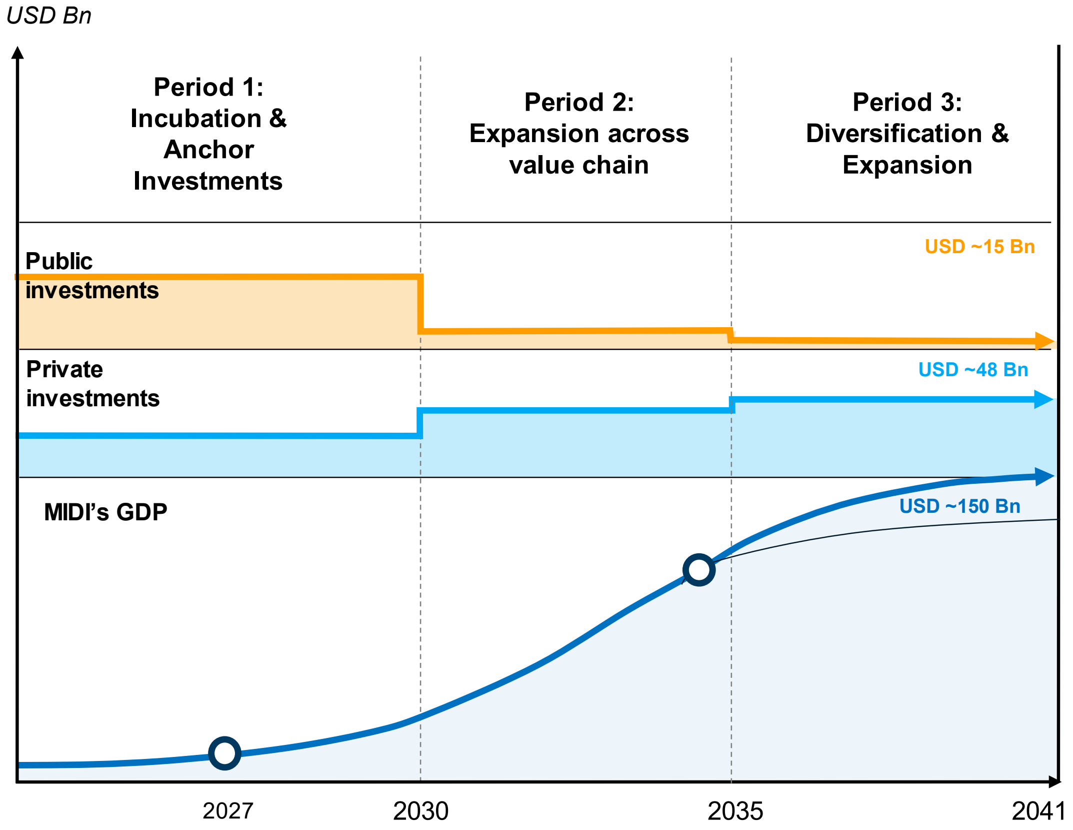


Exhibit 78: Key Milestones in MIDI's Pathway to 2041

Period 1: Incubation Period (Till 2030)	
	Inflexion Point - 2027
A	Super-Critical Projects operationalized – Port Phase 1 / Stage 1, USC Power Plant Phase 1, Port Access road from Chakaria, Land development of EZ 4 and EZ5
B	Master plan finalized
C	MoUs signed and land allotted to anchor industrial investors in key sectors in EZ 4 and EZ5
E	MIDI Authority operationalized
	Till 2030
A	Commissioning of anchor industrial projects

B	Period 1 projects[181] and hinterland connectivity projects completed and operationalized
C	Port container terminal operator selected and on-boarded
D	MOUs signed and land allotted for other industrial sectors
Period 2: Ecosystem Development Period	
A	Investments made and industrial projects commissioned across sectors
B	Period 2 projects completed and commissioned
C	Port Access Rail connectivity till Chakaria operationalized
Period 3: Diversification and Expansion Period	
A	Industrial investments into newer sectors and upstream & downstream integration across value chains
B	Fully operationalized Port & Logistics Hub, Manufacturing Hub, Power & Energy Hub,

10.2. Challenges in MIDI's 2041 aspirations

One of the key metrics of success for MIDI is going to be investment attraction. As estimated, MIDI can potentially attract investments to the tune of USD ~60 Bn over next 18-20 years, approximately two-third being from the private sector.

The road to attracting this investment is going to be challenging and will depend on viability and attractiveness of the project in comparison to other similar industrial regions in the local and regional geography. For MIDI to create an attractive proposition, it must achieve some key short to mid-term milestones.

Proof-of-concept by 2027

Much of investments envisaged at MIDI are contingent upon proof-of-concept of MIDI as a ready for investment proposition, as this can infuse confidence in its strategic importance and commitment of GoBD as well as JICA. As discussed in the initial chapters, many projects are already under construction at MIDI and are at different stages of completion.

Certain critical projects are required for MIDI to kick-off as a ready-to-invest proposition. Some of the critical projects are also witnessing slow movement in development. Hence, to meet the 2031 target, it is important for these critical projects to be operational (or near completion) by 2027, to bring first tranche of the envisaged investment.

Some of these critical projects include:

- Port Phase 1 / Stage 1
- Coal Power Plant Phase 1
- Port Access Road
- Land development EZ 4 and EZ 5

Access rail from Port to Chakaria is also an important project but seem uncertain in near-term because of high cost (expected to ~USD 1.3 bn). Rail connectivity is going to be crucial for container transport / exports and hence, an alternate plan needs to be worked out. In short-term, inter-modal hub can be planned at Chakaria. But in long-term, siding / access rail link till Port and Manufacturing hub will be necessary.

Hinterland connectivity

A key competitiveness challenge for MIDI will be to ensure availability of hinterland connectivity. Some of the important hinterland connectivity projects include:

- Upgradation of NH1 to Dhaka,
- Completion of Chittagong-Cox's Bazar rail link and further upgradation of single-track rail to double-track gauge
- Operationalisation of 765 kV transmission line
- Expansion of oil and LNG pipelines for future demand.

Investment promotion

As discussed previously, investments from private sector will be a key measure of success of MIDI. Apart from achieving key milestones over the years, MIDI as an ecosystem will need to attract investments through targeted investment promotion policies and investor outreach in a phased

[181] Given in Annexure 11.2

manner. This will include a robust incentive mechanism, tailored for target industries, and investment facilitation through approvals support, ease of doing business assistance.

Other than private sector, development investments from DFIs / donors like JICA etc. will be crucial for developing core infrastructure which are essential for long-term sustainability.

Competitive operations & efficient service delivery

The success story of MIDI will ultimately depend upon competitiveness of its port, which can be measured in terms of cost-savings, time-savings, efficient service delivery and ease of doing business for shippers (/ freight forwarders, traders).

In order to achieve this challenge of delivering efficiency, it is important to compare Matarbari port with best ports' operations in the region using some key yardsticks for success. These yardsticks could include mechanization of berths by deploying efficient handling equipment, evacuation capacity of cargo and containers, turnaround time of ships etc.

Land acquisition

Land for power & energy hub is mostly acquired. Land acquisition for manufacturing hub and port development are still underway. But given that previous acquisitions have been smooth, this is not envisaged as a major challenge.

However, the land acquisition may lead to displacement of people whose livelihood is dependent on salt refining and shrimp cultivation in the region. Hence, an appropriate Resettlement & Rehabilitation (R&R) mechanism should be devised by government for the affected people. Further, the government may also design a training cum conditional employment scheme for the displaced people to support them with alternate employment opportunities in the MIDI region. This will make current inhabitants an integral part of MIDI's growth journey.

Ecosystem creation

Ecosystem creation means creation of a large, cohesive development with seamless access to various components, like industrial & warehousing spaces for manufacturing, port terminals for import & export, access to utilities & raw materials like power, LNG feedstock etc. and urban facilities like housing, retail & recreation.
This ecosystem creation is important to attract investments and establish MIDI as a brand identity.

- For example: Tanger Med has established itself as a regional hub with port, industries and connecting infrastructure attracting large amount of public and private investments

Moreover, an integrated development also enables easy availability of skilled manpower due to presence of urban ecosystem. It attracts industries and investments which requires skilled manpower, such as discrete industries like pharmaceuticals, RMG etc. need specific research and development wings and technical manpower.

- For example: The Ministry of Labour in Thailand, launched 100+ training courses in skill-based sectors like technology, robotics, management etc. to attract skilled industries and fulfil demand for skilled labour in the Eastern Economic Corridor of Thailand with industrial clusters like Map Ta Phut, Laem Chabang etc.

Ecosystem creation also ensures coordinated development between various components, for example, providing sufficient power for in-situ demand in a phased manner as required. It also removes any scope for duplicity in development by enabling creation of common infrastructure like roads, residential spaces, social infrastructure, utility services, connectivity to port and industrial area.

Hence, planning, development & operations of MIDI's diverse components as **an "Integrated Ecosystem"** under a common vision & brand identify will be crucial.

Attracting the right talent

MIDI is a currently sparsely inhabited coastal area. For MIDI to be established as an integrated economic region, south of Chittagong, it needs to be able to attract a mix of skilled and semi-skilled workforce in medium to long term.

To attract trained and qualified workforce to MIDI, investments will need to be made in social and residential infrastructure and connectivity at MIDI. Further, while small number of people / workforce may be brought in from outside, the long term sustainable solution would be to develop educational, training and apprenticeship programs for upskilling / reskilling the people of Moheshkhali-Cox’s Bazar region. This presents a huge opportunity for private sector in training, skilling and apprenticeships. Further, this would enable the local population to benefit from economic growth and development in their region.

Exhibit 79: Challenges in MIDI's 2041 aspirations

1. Establishing proof -of-concept

Projects critical to establish proof-of-concept by 2027

● Progress review required ● On track

Projects	Expected year of completion (2022 – 2027)	Status	Criticality
Matarbari Port Phase 1	2027	Under construction	Progress review required
Coal Power Plant Phase 1	24	Under construction	On track
Access road from N1	24	Under construction	On track
Access railway		DPP not prepared yet	Progress review required
SPM and Pipelines	23	90%+ completed	On track
400 kV Power Transmission Lines	23	Completed	On track
Super Dyke		Planned	
Operationalization of EZ 5	25	Planned	Progress review required

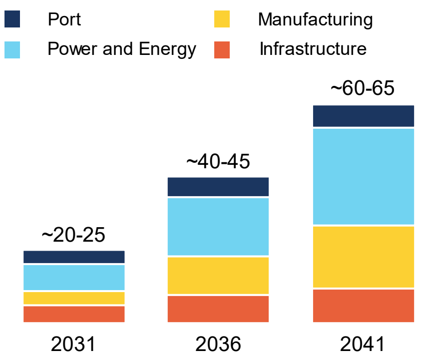
2. Sufficiency in hinterland connectivity

● High ● Low

Infrastructural projects	Current Planned Capacity	Required Capacity in 2041	Criticality
Upgradation of N1 to Dhaka	2-lane (node upgradation certain zones ongoing under JICA funding)	Need for 4-lane access-controlled highway to be evaluated	High
Upgradation of rail to double track	Single track dual gauge (under construction)	Double track dual gauge (no plans so far)	High
400 kV + 765 kV transmission line	400 kV completed	Both need to be operational by 2041	High
SPM and Pipelines	4.5 MTPA oil + 4.5 MTPA HSD	15 MTPA oil + 4.5 MTPA product	Low
LNG Pipelines	1,350 mmcfd (proposed expansion to 3,500 mmcfd)	~2,000-2,500 mmcfd by 2041	Low

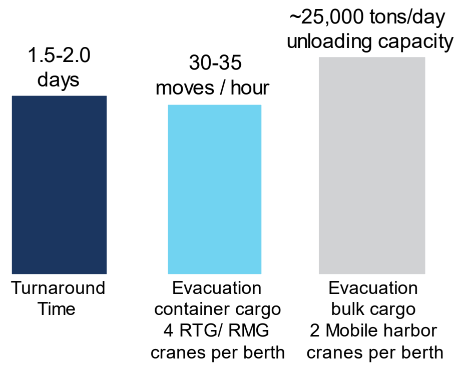
3. Investment Promotion

Investments up to 2031, 2036, 2041
(In USD Bn, 2022 terms)

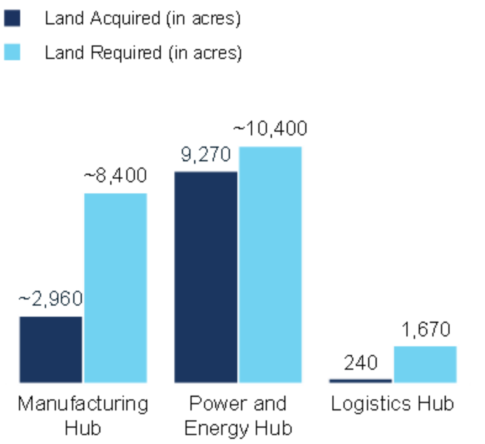


4. Ensuring competitive operations

Yardsticks to define competitive port operations

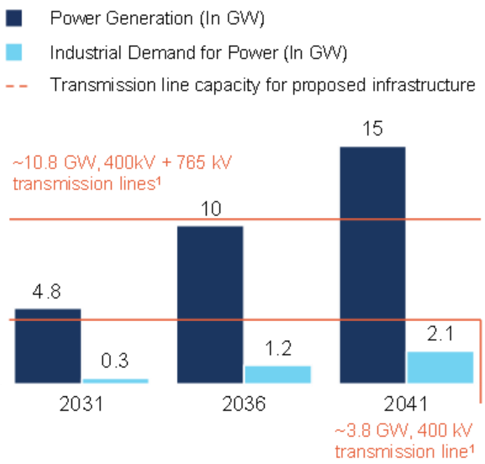


5. Land acquisition across components



6. Establishing integrated ecosystem

Power supply for in-situ use



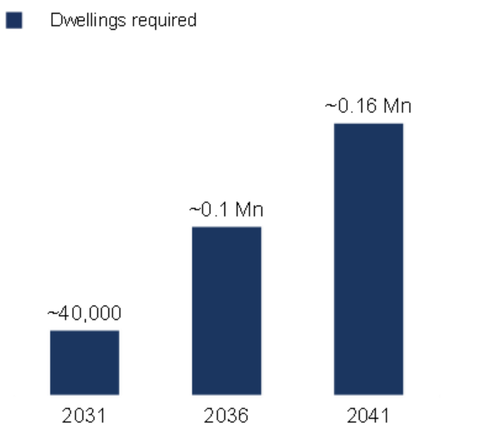
1. With N1 contingency, as per IEPMP

6. Establishing integrated ecosystem

Availability of skilled labour

6. Establishing integrated ecosystem

Availability of housing facilities



6. Establishing integrated ecosystem

Creation of planned integrated community

Housing
~120,000
Dwelling units

Hotels
~3,000
Hotel rooms

Healthcare
~1,000
Beds at general hospital

Education
~50,000
School students

Entertainment
~500 acre of parks
++ **8** Sports center, **~50** acres of shopping complex

10.3. Key Strategic Priorities

5 urgent actions could ensure that MIDI's transition to 2041 is orderly.

This report proposes 5 key actions required to accelerate and smoothen MIDI's journey:

1. **Over next 5 years, build momentum and accelerate efforts to establish "proof-of-concept".**
   This will include delivery of critical infrastructure projects and private sector investments.

2. **In parallel, develop a physical master plan and pipeline of investable projects.**
   This will entail MIDI master plan (including revised land use plan), uniform land allotment policy for MIDI and list of investable projects, which would need to be supported by technical and economic / financial feasibility assessment. To support this, a dedicated investor facilitation cell may be created for MIDI.

3. **Build accountability and speed-up decision making.**
   To support the realization of MIDI vision, two priorities on governance front exist:
   - **Fast-track formation of MIDI Authority** as a nodal agency for planning, regulating and managing MIDI
   - Till such time, **evaluate a delivery unit within MIDI CC** to build leadership commitment.

4. **As MIDI takes shape, accelerate investment promotion at all fronts.**
   Crucial fronts will include:
   - **Create investment promotion plan** – Prioritize domestic anchor investors across focus areas
   - Develop sector-specific / tailored incentives (tariff regime on imports, power & LNG, faster approvals etc.)

5. **Engage shipping lines & terminal operators to establish direct connectivity to MIDI port.**
   Build private partnerships in areas critical to ensure competitiveness – specifically operations of container and energy import terminals (LNG terminal, LPG terminal, Oil terminal). Also, early-on engagement with shipping lines is crucial to bring Matarbari on international shipping routes.

1. Over next 5 years, build momentum and accelerate efforts to establish proof-of-concept.

This implies:

- **Commission critical infra projects within MIDI –** Port Phase I / Stage I, Port Access Road and Land development for EZ 4 & EZ 5.
- **Ensure hinterland connectivity –** N1 upgradation, Completion of Chittagong-Cox bazar rail line and Development of ICD at Chakaria.
- **Provide requisite government support to facilitate timely completion of visible anchor investments / projects by the private sector**.

2. In parallel, develop a physical master plan and pipeline of investable projects

While the critical proof-of-concept projects are underway, work on laying the blueprint for future investments could be started.

Four priorities exist:

- **MIDI Master Plan** including revised land use plan for reallocation of land
- Develop **transparent & uniform land allotment policy** for MIDI
- **Prioritize investable projects** basis feasibility (e.g. – access rail link)
- Create a **dedicated Investor Facilitation Cell** for MIDI

Priority 1: Master Plan

The MIDI Master Plan should have various complementary layers:

- **Revised land use plan** – identifying projects, location of projects, relative size and connectivity and allocation across various implementation agencies.
- **Infrastructure plan** – with demand estimation, network map, size & scale of basic physical infrastructure & utilities like Internal roads, Power Distribution, Water supply, Sewerage & Storm water drainage, Effluent treatment, Land development (cutting, filling and levelling), Street-lights, Embankments, Fibre optics & IT, Gas, Landscaping etc.
- **Common development control guidelines & regulations for MIDI** – outlining Urban design regulations (e,g. - height, plot margins, set back, floor space index, density etc.; Pollution control regulations (e.g. – Compulsory "zero discharge policy" and "captive effluent treatment plant" within each large industry); Common area urban design guidelines (e.g. – distance between street-lights, height & luminosity of street lights, landscape guidelines, road design guidelines)
- **Social infra plan –** identifying social infrastructure like housing, retail, amenities (sports, recreation, healthcare, education)
- **Phasing plan**
- **Transport and circulation plan** across different components.

The modifications in MIDI Master Plan will further lead to the need of reassessment and integration of SDPs prepared for various sectors in line with the finalized master plan.

Priority 2: Uniform Land Allotment Policy

Certain uniform policies might help build investor confidence by bringing transparency in doing business. One such policy can be uniform land allotment policy for MIDI in line with finalized master plan. The policy needs to define norms for land allotment covering:

- Mode of allotment
- Tenure of allotment
- Rate of allotment
- Other terms of lease / license

Priority 3: Investable Projects

Projects identified in LUDP-2019 and in proposed MIDI Master Plan would need to be prioritized for investment and development basis technical and economic / financial feasibility.

A phasing plan would be needed to prioritize investments, leadership efforts, responsibilities across various implementation bodies etc.

Priority 4: Dedicated Investor Facilitation Cell
Several roadblocks can be faced even after the investment is commitment / announced. In order to make the road smooth for potential investors, a dedicated Investor Facilitation Cell may be set-up for MIDI, which can hand-hold investors in approvals, land acquisition, engagement with implementation agencies etc.

Two specific types of cells may be required: for domestic investors and for foreign investors.

For foreign investors, country-specific investor promotion and facilitation cells (say Japan cell, India cell) can be formed.

Note: Initial domestic interest is already visible in the region.

- Chittagong based TK Group, through various subsidiaries, has been allotted ~450 acres land in EZ 5 for refinery, petrochemical complex and LPG terminal.

- Chittagong based S. Alam Group has also shown interest in development of, 3-4 MTPA refinery, Steel & cement manufacturing and clean power generation (other than solar).

  S. Alam Group already has large presence in Banshkhali area (~50 km north of Matarbari), where they have recently completed power plant and are planning to develop cement grinding unit (~1 MTPA) and Steel plant (~5 MTPA).

- Summit Corporation (JV of JERA and Pioneer Generation Singapore) already operates a FSRU in MIDI. JERA has ~22% stake in the Summit Corporation. The group has committed ~USD 1.2 Bn investments in energy & power sector in Bangladesh.

  They have also proposed a 1,000 mmcfd land-based LNG terminal at Matarbari.

- Orion Power is planning to develop a 635 MW coal power plant in MIDI. Land has already been allotted to them.

3. Build accountability and speed-up decision making

As seen around the world, role of an anchor nodal agency is crucial.

Hence, two priorities emerge:

1. Fast-track formation of MIDI Authority

As MIDI now looks at an ambitious strategic vision for 2041, it is important to be spearheaded by an agency which can monitor and champion the holistic vision rather than looking at any particular component alone.

Looking at global learnings, the nodal agency will need to play three crucial roles:

- Plan, regulate and monitor the MIDI development & operations in line with larger vision.
- Coordinate with different implementation agencies to ensure achievement of common goals.
- Undertake investment promotion for MIDI as an integrated ecosystem.

Learnings from other global developments and their governance structures show the following:

- The nodal body is typically empowered through a statutory act, giving it a geographical jurisdiction.
- The nodal body typically has its own full-time staff / officials which can take up day-to-day activities.
- The nodal body typically has sufficient powers to command implementation over other implementation agencies.
- The head of the nodal body is typically appointed for an appropriate duration (say 3-5 years), over which suitable decision-making & implementation is possible.

- The nodal body has suitable mechanisms to raise financing, earn revenue and use funds appropriately (may be through an escrow-based fund) for project's development, management and marketing & promotion.

MIDI Authority Act (nomenclature currently in process of being finalized by the government) is in draft stages[182]. The same may be reviewed to capture global learnings.

2. Till such time, evaluate a delivery unit within MIDI CC to build leadership commitment

Till such time MIDI Authority is formed, a temporary umbrella set-up may be created.

If required, a dedicated monitoring mechanism may be set-up, under PMO leadership / MIDI CC, for next 3-4 years until the proof-of-concept projects are off-the-ground and anchor investments are tied-up. This forum would need to address issues related to development financing, approvals & clearances, inter-agency issues, granting of special approvals etc.

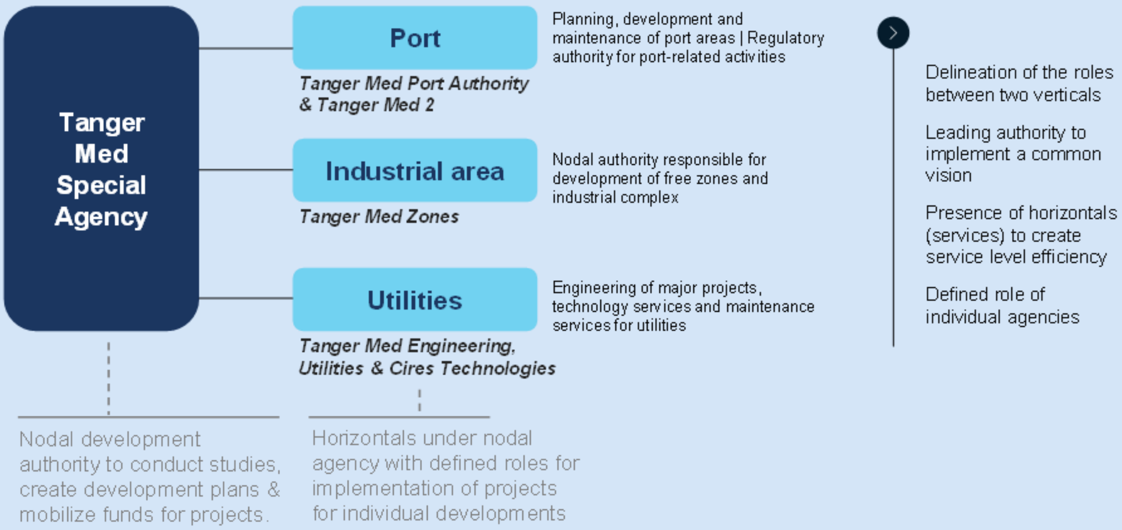
Several example of such delivery units can be seen globally. The units can be in the form of active "war rooms" or "programme management units". Typical characteristics of such delivery units:

- They are short-term (2-5 years).
- They are constituted with leadership from government, supported by dedicated working groups for specific tasks.
- In absence of in-house capabilities, external professional support may also be taken for delivery of key roles like project monitoring, investment promotion etc.
- Such delivery units drive all efforts via a central command structure.
- They gather feedback and enable quick decision making across all levels to ensure agile operations.
- They are designed to boost level of collaboration between different agencies and accelerate initiative delivery to maximize realized impact.

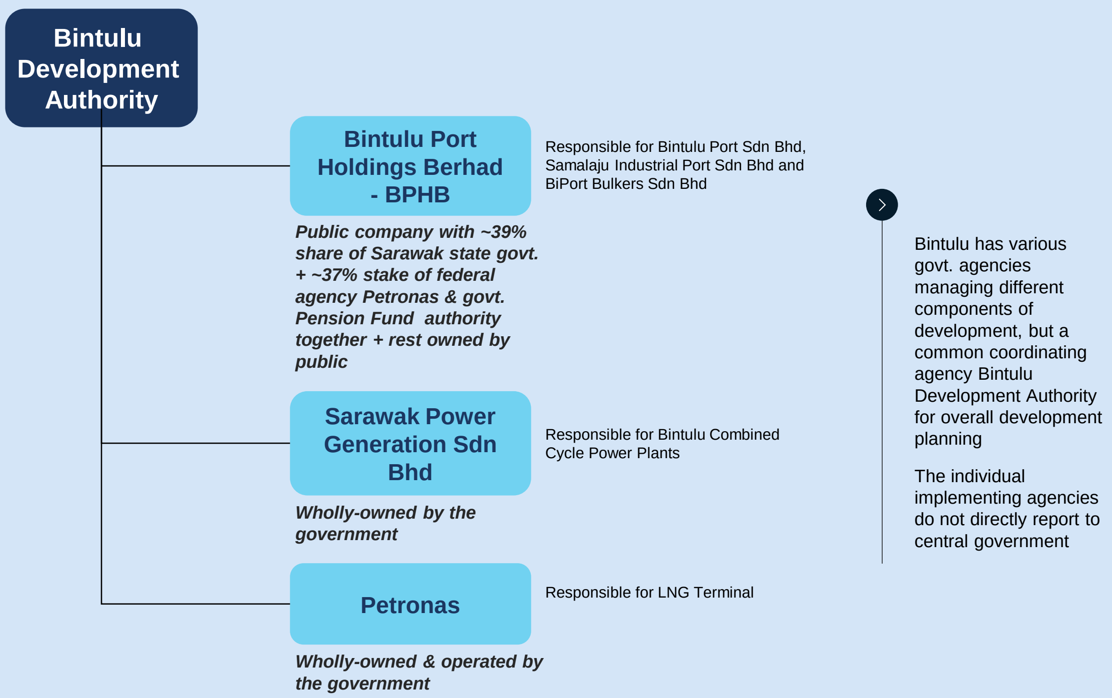
[182] The scope of this report doesn't entail review or comment on the draft Act.

3. Governing body

Model 1 - An anchor agency with SPVs under it for development – Tanger Med Special Agency (Morocco)



Model 2 - A common coordinating agency for overall development planning – Bintulu Development Authority (Malaysia)



4. As MIDI takes shape by 2027, accelerate investment promotion at all fronts.

As discussed previously, bulk of investments for MIDI's mid to long term roadmap are linked to Manufacturing hub and Power & Energy Hub.

In short-term, investments by existing industrial conglomerates and business houses of Bangladesh will be much desired and crucial to build confidence in the economic viability of the project. Such investors know the region, having working experience in the region (like Chittagong), understand Bangladesh's way of doing business and can show maximum ground action in shorted possible time. Such investors will also be themselves invested in MIDI's growth ultimately leading to Bangladesh's growth.

Further, much of value addition potential of MIDI can be leveraged by business conglomerates who have existing presence across the value chain of various sectors (E.g. – Oil refining and polymer manufacturing to feed into existing chemical & plastic industry).

While MIDI establishes itself on the regional map of South Asia, such domestic investments can also help in attracting foreign investors.

Based on learnings from successful investment promotion by global benchmarks, the following may be considered:

- **Define sector-specific incentive policies**
  Specific measures in target sectors can boost their competitiveness and incentivize more investments. Such policies can also showcase long-term outlook of the government to promote manufacturing in the sector. Incentive policies of countries like Vietnam, Thailand, which are fast developing as manufacturing hubs, can be studied in this regard. Such reforms could be:
  - **Stable tariff regime considering long-term sectoral perspective.**
    Tariff regime can also open up opportunities across the value chain. For ex. – import duty on PVC resin (~25%) is currently lesser than import of ethylene (~37%)[183], which incentivizes import of PVC resins rather than domestic manufacturing of resins.

    Further, import duties on some products (like palm oil import) have seen frequent changes as short-term measures by the government to control commodity prices. While this is a normal economic practice, a policy outlook on long-term plan of the government can boost investor confidence.
  - **Tailored incentives to make the sector cost-competitive and remove cost disadvantage with other emerging economies.**
    For example, power and LNG feedstock is a huge cost for bulk industries, where directed subsidies can be useful.

    Some of the incentives could be selective and targeted towards large investors. For example, incentives in sectors like chemicals, polymers etc. can be tied to innovation and technology-integration, which can effectively improve cost-advantage of the sector to export.
- **Create MIDI's Investment promotion and Investor Outreach Plan**
  A sector-specific partnership plan needs to be created which can help the relevant agencies plan, initiate and carry out their investor promotion in a streamlined manned. This partnership plan needs to lay out potential candidates (& their priority), timelines of outreach, possible models of partnerships.

[183] As of Feb 2023

5. Engage shipping lines and terminal operators to establish direct connectivity to MIDI port

Private sector capabilities may be leveraged in the form of financing, development and/'or operations of key projects like power plants, port terminals and energy terminals.

Also, engagement with shipping lines will be crucial to ensure that Matarbari is recognized as part of international routes.

Case examples

A. Private operations at Map Ta Phut Port, Thailand

Map Ta Phut port comprises of public terminals for general customers and dedicated terminals for specific companies and operators. The public terminals are operated by the Industrial Estate authority of Thailand wholly, or in PPP with private companies.

Public Terminals

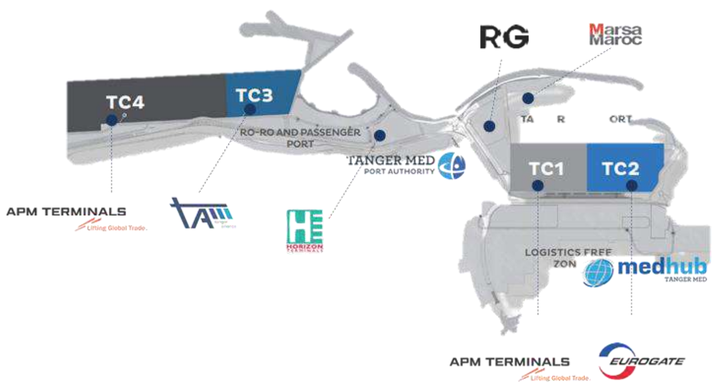
	4 Berths	Map Ta Phut Industrial Terminal (IEAT)
TCT	2 Berths	Thai Connectivity Terminal
Thai Tank Terminal	4 Berths	Thai Tank Terminal (PPP)

Dedicated Terminals

NFC	1 Berth	Fertilizer products & chemicals
SPRC	7 Berths	Oil, LPG, Fuel
ptt GLOBAL CHEMICAL	3 Berths	Oil & Fuel
SCGC	4 Berths	Petrochemicals
GLOW	1 Berth	Coal
BLCP POWER	1 Berth	Coal
ptt LNG	3 Berths	LNG
ptt TANK	2 Berths	Chemical products
SCG CHEMICALS	1 Berth	Petrochemicals

B. Private operations at Tanger Med Port, Morocco

The operations of various terminals are operated by world-renowned operators under concession agreements.



APM TERMINALS	CT 1	1.5 Mn. TEU
EUROGATE	CT 2	1.5 Mn. TEU
TA	CT 3	1 Mn. TEU
APM TERMINALS	CT 4	5 Mn. TEU
HORIZON TERMINALS	Hydrocarbon Terminal	15 MTPA
RG	Vehicle Terminal	1 Mn. Vehicles
Marsa Maroc	Bulk & General Cargo Terminal	0.8 MTPA
TANGER MED PORT AUTHORITY	Passenger & Ro-Ro port	7 Mn. Passengers 0.7 Mn. trucks
medhub	Logistics Zone	300 ha

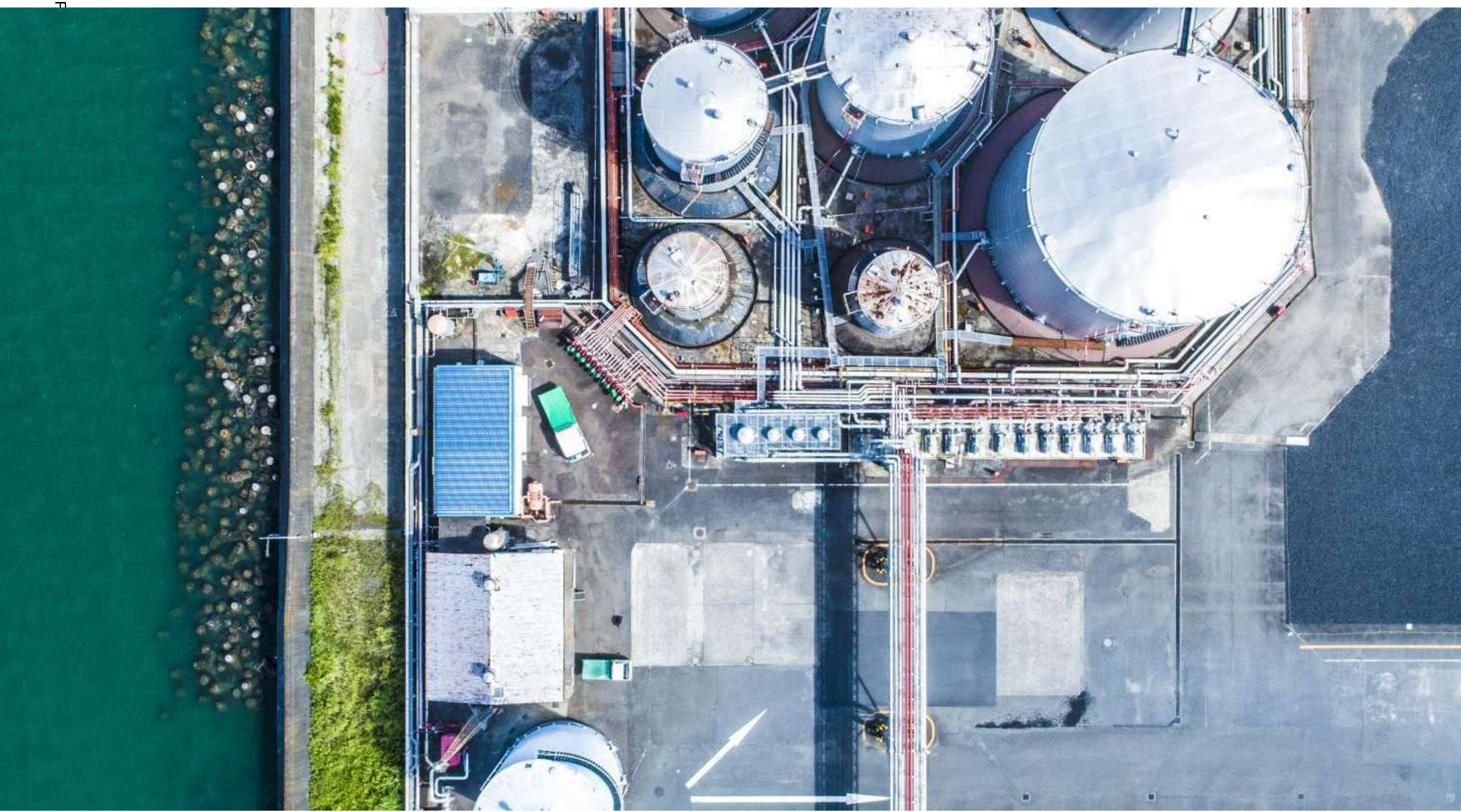
10.4. Action Plan

The strategic priorities are converted into an action plan below:

#	Action Plan	Target Timelines [184]	Concerned Agency
1	**Create momentum and accelerate efforts to establish proof-of-concept**		
	Identify critical projects (within MIDI and hinterland connectivity) and next steps to ensure their implementation.	June '23	Concerned GoBD ministries & implementation agencies, anchored by PMO
2	**Translate vision & strategy into physical plan**		
	Finalize MIDI Master Plan	Aug '24	MIDI Cell
	Develop uniform land allotment policy in line with finalized master plan	Aug '24	GoBD
	Finalize pipeline of investable projects through feasibility assessment	Aug '24	MIDI Cell
	Create Investor Facilitation Cell	Dec '23	MIDI Cell / MIDI Authority
3	**Fast-track MIDI Authority formation**		
	Enactment of MIDI Authority Act	Dec '23	GoBD
	Staffing of Authority and commencement of operations	Dec '24	GoBD
	Define framework for formation of interim Delivery Unit	June '23	GoBD
	Set-up and operationalize Delivery Unit	Sept '23	GoBD
	Capacity building of relevant agencies	Ongoing	GoBD
4	**Investment Promotion**		
	Finalize Investment Promotion and Investor Outreach Plan	Dec '23	Concerned GoBD ministries & implementation agencies, anchored by MIDI Cell / MIDI Authority
	Sector-specific investment promotion policy	Aug '24	GoBD
	Initiate investor outreach	Immediate	MIDI Cell / MIDI Authority
5	**Build partnerships**		
	Onboard private sector operator for container terminal	Early 2027	CPA
	Onboard private sector operator for SPM operations	Dec '23	BPC / PetroBangla
	Execute contract with private sector developer for LNG and LPG terminal	2024	BPC / PetroBangla

[184] Timelines are indicative and subject to finalization by GoBD

Annexures



11. Annexures

11.1. Studies and surveys undertaken

The following exhibit shows the chronology of studies and surveys undertaken for MIDI project so far.

Exhibit 80: Chronology of studies and surveys

Overview: MIDI | Sector Development Plans & Master Plan | Survey and Technical Studies | Key Documents

2016

- DCS[1] on Matarbari Port Development
- Preparatory Survey on Matarbari Port Development

2019

- Land Use & Development Planning Survey
- Railways SDP
- Power SDP
- Energy SDP
- Ports SDP
- Roads SDP
- Industrial Economic Zones, January 2021
- Feasibility Report - Rail Link to MM[2] Power Plants & Port Area

2022

- MIDI Outline
- Project list of ongoing projects
- Draft Integrated Energy and Power Master Plan
- DCS[1] for strengthening framework on operation & implementation of MIDI
- Project for Promoting Investment & Enhancing Industrial Competitiveness

1. Data Collection Survey
2. Matarbari-Moheshkhali

11.2. MIDI - List of Projects

A list of the projects under MIDI as per Land Use and Development Planning Survey, 2019 and further updated as per Project Monitoring List (June 2022) is as below.

Logistics hub

Exhibit 81: Logistics Hub – List of Projects

Project	Implementation Agency	Outline	Details	Status[185]	Priority
Matarbari Port Stage 1 (Phase 1)	CPA - MoS	1 berth for multi-purpose terminal 1 berth for container terminal	240 acres	Land acquired. Expected completion – 2027. Construction not started yet[186]	Period 1 (Super-critical)
	CPA - MoS	Breakwater	North length – 2,150 m, South length – 670 m	Completed	-
Matarbari Port Stage 1 (Phase 2)	CPA – MoS	3 berths for container terminal + 3 feeder berths 3 coal berths and 1 LNG berth	390 acres	Land not acquired	Period 2
Matarbari Port Stage 2	CPA - MoS	3 berths for container terminal + 3 feeder berths 4 berths for multipurpose and bulk terminal	540 acres	Land not acquired	Period 3
Matarbari Port Access Road	CPA - MoS	25.7 + 1.6 km Road and 17 Bridges Initially 2-Lanes, Port Connector Road 2.2 km	27.3 km	Expected completion by 2027[184]	Period 1 (Super-critical)
Matarbari Port Access Road – connecting road	RHD - RTHD / CPA - MoS	Part of Connecting Road in Matarbari Port Access Road	-	Expected completion by 2027[184]	Period 1 (Super-critical)
Matarbari Power Plant Access Road (community road)	RHD - RTHD	Embankment Road from Rajghat to Mohoriguna & new Kohelia Bridge	7.3 km	Under construction. Expected completion by 2023	Period 1 (Super-critical)
Moheshkhali - Cox's Bazar Road and Bridges	RHD - RTHD	Connect between MM and Cox's Bazar with large bridge (>1,000m)	-	Expected completion by 2031	Period 2/3

[185] As per project monitoring list shared by JICA – June'2022
[186] Status update as per meetings

Project	Implementation Agency	Outline	Details	Status[185]	Priority
(Trans Moheshkhali Highway)					
Matarbari Port Access Railway	BR - MoR	Port Access Railway from Matarbari to Dohazari - Cox's Bazar Line	38 km USD 1.5 Bn	Land acquired; DPP not yet approved	Period 1
Logistics Centre	(TBD)	Inland Container Depot (ICD) and other logistics centre	500 acres	Land not acquired	Period 1

Note:

1. Other improvements being undertaken by RHD / RTHD to improve hinterland connectivity include –
    a. Improvement of National Highway No.1 – brownfield widening in certain sections, ADB funded
    b. Greenfield Edimony to Cox's Bazar Road (36.9 km) – proposed, DPP prepared
    c. Marine Drive from Mirsharai to Cox's Bazar through Moheshkhali-Matarbari – proposed
    d. Gorakghata-Sonadia Island (Z1004) Road – brownfield road widening
2. Rail link development project connecting Dhaka-Chittagong-Cox's Bazar (DCCRPPF) – funded by ADB

Power and Energy hub

Exhibit 82: Power and Energy hub – List of projects

Project	Implementation Agency	Outline	Details	Status[187]	Priority
Power					
Matarbari USC Coal Power Plant #1, #2, #3, #4	CPGCBL	2,400 MW	1,620 acres	Phase 1 – Under construction, expected completion by July'2024 Phase 2 - Only common utilities and transmission infra constructed as part of Phase 1. Phase 3 & 4- cancelled	Period 1 (Super-critical)
CPGCBL Coal Power Plant – Kohelia Power Plant	CPGCBL/ Sembcorp/ Mitsui	700 MW	1,170 acres	Land acquired; DPP approved	Cancelled
Orion Coal Power Plant	Orion Power	635 MW	600 acres	Land allotted; Feasibility study ongoing	Period 1
Matarbari USC Coal Power Plant #5, #6	CPGCBL/ Sumitomo	1,200 MW	1,320 acres	Cancelled	Cancelled
BPDB Power Hub	BPDB and Private Companies	8 Block Coal Power and 1 Block LNG Power Total: 13,560 MW	5,675 acres	Land acquired- 5,580 acres	Cancelled

[187] As per project monitoring list shared by JICA – June' 2022

Project	Implementation Agency	Outline	Details	Status[187]	Priority
CPGCBL LNG Power Plant	CPGCBL/Mitsui	500-630 MW	-	Included in CPGCBL CPP	-
CPGCBL Solar Power	CPGCBL and others (TBD)	-	460 acres	PDPP is under process	Period 2
Matarbari Power Transmission Line	PGCB	400 kV Line	-	Completed	Period 1 (Super-critical)
Matarbari Power Transmission Line	PGCB	765 kV Line	-	Proposed	Period 2
Coal Transhipment Terminal (CTT)	CPGCBL and Sumitomo (TBD)	Coal Transhipment Terminal and Belt Conveyer	112 acres	Land not acquired	Need assessment required
Energy					
Moheshkhali FSRU	Excelerate/ IFC	LNG Import Capacity: 500 mmcfd	Offshore	Completed, operational	Operational
Moheshkhali FSRU	Summit/ Mitsubishi	LNG Import Capacity: 500 mmcfd	Offshore	Completed, operational	Operational
Land-based LNG Terminal	Summit/ Mitsubishi	1,000 mmcfd by 2024 phased development at 1,500 mmcfd by 2030, 2,000 mmcfd by 2041	3.8 Mn tons	Land acquired, EOIs received[188]	Period 2
LPG Terminal	TK Group/SK Gas/Mitsui	Butane Gas Storage: 45,000 Ton Propane Gas Storage: 30,000 Ton	45 acres	Proposed; Land allotted (20 acres to TK Group)	Period 2
LPG Terminal	BPC and others (TBD)	(TBD)	Included in Oil Refinery	Marubeni Corporation, Vitol – approved by government[189]	Period 2
SPM with double pipeline	BPC/ERL	Unloading Capacity: 9 MTPA 3 Crude Oil Tank and 3 HSD Tank	190 acres (tank yard)	>90% complete[188]	Period 1 (Super critical)
Moheshkhali-Anowara Gas Transmission Pipeline	GTCL - EMRD	30" × 91Km, 600mmcfd capacity	-	Completed, operational	Operational
Moheshkhali-Anowara Gas Transmission Pipeline	GTCL – EMRD	42" × 79Km, 1,200mmcfd capacity	-	Completed, operational	Operational
Moheshkhali Zero Point Gas Transmission	GTCL - EMRD	42" × 07Km, 1,500mmcfd capacity /CTMS at Moheshkhali	-	Completed, operational	Operational

Note: Orion Group's 635 MW coal fired power plant to be shifted to MIDI – Land allotted; feasibility study ongoing (Expected completion by 2027)

[188] Status update as per meetings
[189] Basis news article

Industries hub

Exhibit 83: Industries hub – List of projects

Project	Project owner	Outline	Details	Status[190]	Priority
Sonadia Eco Tourism Park	BEZA and others (TBD)	Eco Tourism Park	~909 acres	Land acquired	Period 3
EZ 1	BEZA and others (TBD)	Eco Friendly Industries and Commercial Activities	12,612 acres (includes above-mentioned 909 acres)	Land acquired	Period 3
EZ 2	BEZA and others (TBD)	827 Acre for Light Industry and Logistics	1,616 acres	Land not acquired	Period 1
EZ 3	BEZA and others (TBD)	EZ for Port-led Industry	1,557 acres	Land not acquired	Period 2
EZ 4	BEZA and others (TBD)		1,722 acres	Land acquired	Period 2/3
EZ 5	BEZA, TK Group and others (TBD)	Oil Refinery & Petrochemical Project	1,240 acres	Land acquired	Period 1 (Super-critical)
EZ 6	BEZA and others (TBD)	-	1,540 acres	Land not acquired	Period 2/3
EZ 7	BEZA and others (TBD)	-	758 acres	Land not acquired	Period 2/3
EZ 8	BEZA and others (TBD)	-	112 acres	Land not acquired	Period 2/3
Super Dyke	MoWR	17.75 km long embankment to protect Matarbari Coal Power Plant, IEZ 4 and IEZ 5	17.75 km	-	-
Embankment	BWDB - MoWR	Rehabilitation of Damaged Polder	-	Completed, operational	-

Note: for EZ 5

450 acres allotted to TK Group of Industries

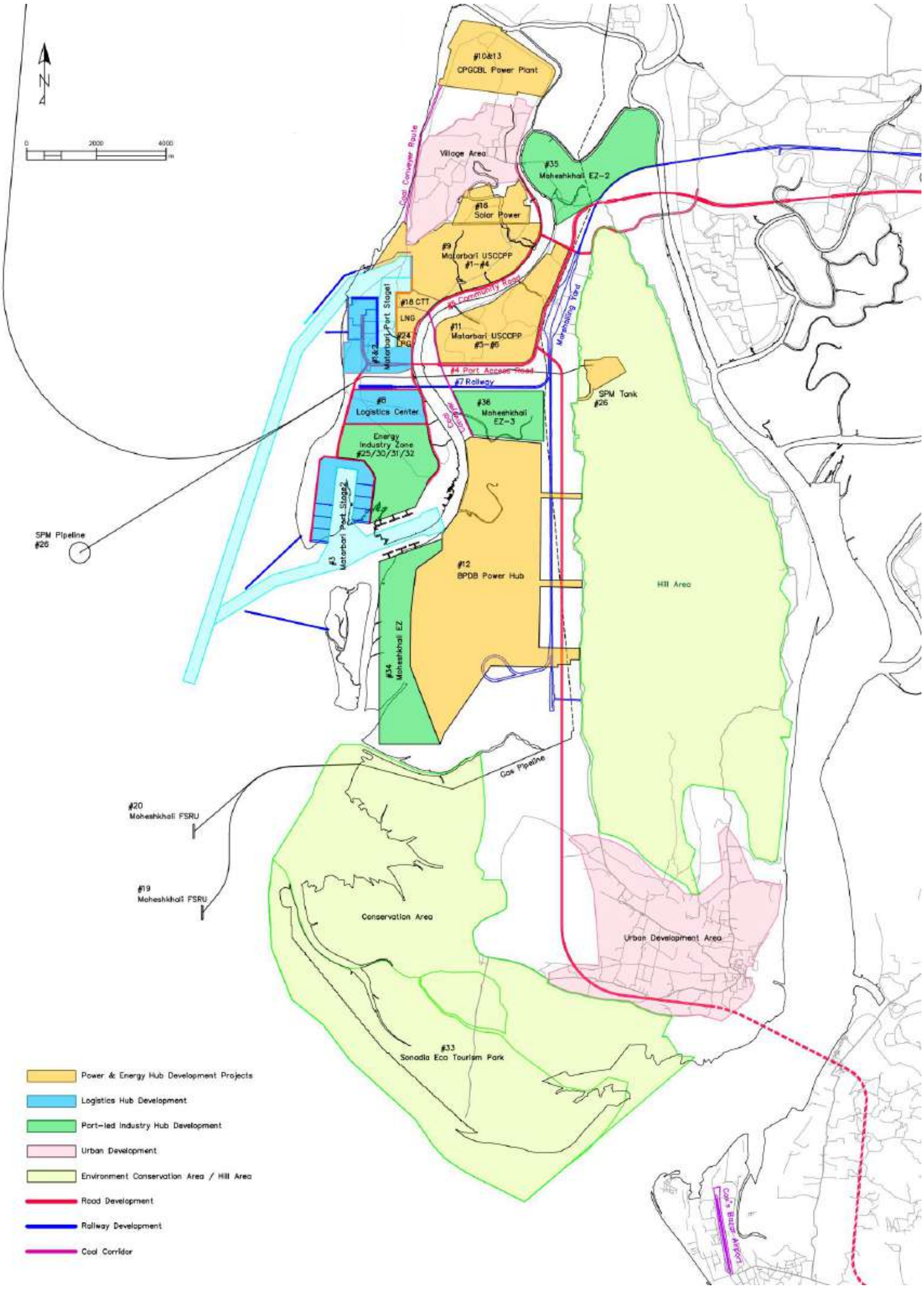
- 200 acre – Refinery (6 MTPA)
- 246 acres - Petrochemical Complex Limited
- 20 acre – LPG terminal

100 acres to Samuda Chemical Complex Limited (SCCL). Further, some land to be allotted to SIAM Gas and AWCA

[190] As per project monitoring list shared by JICA – June'2022

11.3. MIDI - Land Use Plan

Exhibit 84: MIDI - Long-term land use plan (LUDP 2019)



Project list of MIDI area as per LUDP-2019[191]

Exhibit 85: Project list of MIDI area as per LUDP-2019

Logistics Hub

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
1	Port	Matarbari Port Phase 1	CPA	1 Jetty for Multi-Purpose Terminal 1 Jetty for Container Terminal	○	△	△		2023	Matarbari/ Dhalghata
2	Port	Matarbari Port Phase 2	(TBD)	3 Jetty for Container Terminal 4-6 Jetty for Industrial Use	△		△		2028	Matarbari/ Dhalghata
3	Port	Matarbari Port Phase 3	(TBD)	3 Jetty for Commercial Terminal Other Jetty for Bulk & Industrial Use					2035	Dhalghata
4	Road	Matarbari Port Access Road	RHD	27 km Road and 17 Bridges Initially 2-Lanes, Port Connector Road 2.2 km	○	△	△		2024	From Matarbari to N1
5	Road	Matarbari Power Plant Access Road	RHD	Embankment Road from Rajghat to Mohoriguna & new Kohelia Bridge	○	○	△	△	2023	Chakaria/Moheskhali / Matarbari/Dhalghata
6	Road/ Bridge	Moheshkhali - Cox's Bazar Road and Bridges	(TBD)	(TBD)					-	Moheshkhali to Cox's Bazar
7	Railway	Matarbari Port Access Railway	BR	Port Access Railway from Matarbari to Chittagong - Cox's Bazar Line	△				2024	Matarbari to Chakaria
8	Logistics	Logistics Center	(TBD)	Inland Container Depot (ICD) and other logistics center					-	Dhalghata

○ = Completed △ = Under Process

Power & Energy Hub - Power

[191] All commencement operation dates are as per LUDP, 2019 – current status of all projects is captured separately in Section 3

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
9	Coal Power	Matarbari USC Coal Power Plant #1, #2, #3, #4	CPGCBL	Generation Capacity: 2,400MW	○	○	○	△	2024	Matarbari
10	Coal Power	CPGCBL Coal Power Plant (with Sembcorp/Mitsui)	CPGCBL/Sembcorp/ Mitsui	Generation Capacity: 1,400MW	○	○	○	△	2025	Matarbari North
11	Coal Power	Matarbari USC Coal Power Plant #5, #6 (with Sumitomo)	CPGCBL/Sumitomo	Generation Capacity: 1,200MW	△	△	△		2025	Kalarmarchara
12	Coal Power	BPDB Power Hub	BPDB and Private Companies	8 Block Coal Power and 1 Block LNG Power Total Generation Capacity:13,560MW	△		△		2025	Hoanok/ Kalarmarchora
13	LNG Power	CPGCBL LNG Power Plant (with Mitsui)	CPGCBL/Mitsui	Generation Capacity: 500-630MW		△	△		2023	Matarbari North
14	LNG Power	Gas to Power (with Summit/Mitsubishi)	Summit/ Mitsubishi	Generation Capacity: 2,400MW	△				2024	Dhalghata (Matarbari Phase-2)
15	LNG Power	Gas to Power (ETT) (with CPGCBL/Sumitomo)	CPGCBL/Sumitomo	Generation Capacity: 1,200MW	△				2024	Dhalghata (Matarbari Phase-2)
16	Solar Power	CPGCBL Solar Power	CPGCBL and others (TBD)	TBD					-	Matarbari North
17	Power Grid	Matarbari Power Transmission Line	PGCB	400 kV Line Ongoing 765 kV Line & 400 kV Line Planned					-	Matarbari/ Moheshkhali
18	Coal Terminal	Coal Transshipment Terminal (CTT)	CPGCBL and Sumitomo (TBD)	Construction of Coal Transhipment Terminal and Belt Conveyer	○				2024	Dhalghata (Matarbari Phase-2)

○ = Completed △ = Under Process

Power & Energy Hub – Energy

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
19	LNG Terminal (FSRU)	Moheshkhali FSRU (with Excelerate)	Excelerate/IFC	LNG Import Capacity: 500MMCFD	○	○	○	○	2018	Offshore
20	LNG Terminal (FSRU)	Moheshkhali FSRU (with Summit)	Summit/ Mitsubishi	LNG Import Capacity: 500MMCFD	○	○	○	△	2019	Offshore

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
21	LNG Terminal (Land-base)	Land-based LNG Terminal (with Summit/Mitsubishi)	Summit/ Mitsubishi	450MMCFD for Power 1,050MMCFD for National Grid	△				2024	Dhalghata (Matarbari Phase-2)
22	LNG Terminal (Land-base)	Land-based LNG Terminal (ETT) (with CPGCBL/Sumitomo)	CPGCBL/ Sumitomo	200MMCFD for Power 800MMCFD for National Grid	△				2024	Dhalghata (Matarbari Phase-2)
23	LNG Terminal (Land-base)	Land Based LNG Terminal (Open Tender by Petrobangla)	Petrobangla (RPGCL) with partner (TBD)	1,000MMCFD					2024	Dhalghata (Matarbari Phase-2)
24	LPG Terminal	LPG Terminal	TK Group (SPL)/SK Gas/Mitsui	Butan Gas Storage: 45,000 Ton Propan Gas Storage: 30,000 Ton	○				2023	Dhalghata (Matarbari Phase-2)
25	LPG Terminal	LPG Terminal	BPC and others (TBD)	(TBD)					-	Dhalghata
26	Oil Terminal	SPM with double pipeline	BPC/ERL	Unloading Capacity: 9 MTPA 3 Clude Oil Tank and 3 HSD Tank	○	○	△		2021	Offshore/ Kalarmarchara
27	Gas Transmission	Moheshkhali-Anowara Gas Transmission Pipeline	GTCL	30" × 91Km, 600MMCFD capacity	○	○	○	○	2018	Moheshkhali Zero Point to Anowara
28	Gas Transmission	Moheshkhali-Anowara Gas Transmission Parallel Pipeline	GTCL	42" × 79Km, 1,200MMCFD capacity	○	○	○	△	2019	Moheshkhali to Anowara
29	Gas Transmission	Moheshkhali Zero Point Gas Transmission Pipeline & CTMS	GTCL	42" × 07Km, 1,500MMCFD capacity /CTMS at Moheshkhali	○	○	△		2019	Kutubzome/Bara Moheshkhali/Hoanok /Kal armarchora

○ = Completed △ = Under Process

Industries Hub

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
30	Oil Refinery	Oil Refinary & Petrochemical Project	TK Group (SPL) and others (TBD)	370 Acre EZ for Oil Refinary and Storage of Products	△		○		-	Dhalghata
31	Oil Refinery	Oil Refinary & Petrochemical Project	BPC and others (TBD)	Refinery: 10 Mil Cu.m/year Petrochemical Complex, LPG Plant					-	Dhalghata

ID	Sub-Sector	Project Name	Project Owner	Outline	F/S	DPP	Land	Const	Opera	Location
32	Energy/Food Storage	Samuda Basic Chemicals, Edible Oil and Grain Project	TK Group (SCCL) and others (TBD)	100 Acre for Grain Silo (Capacity: 500,000Mtons)	△		○		-	Dhalghata
33	Tourism (EZ)	Sonadia Eco Tourism Park	BEZA and others (TBD)	9,466 Acre for Eco Tourism Park	△		○		-	Sonadia
34	EZ	Moheshkhali EZ	BEZA and others (TBD)	EZ for Waterfront Industry			△		-	TBD
35	EZ	Moheshkhali EZ-2	BEZA and others (TBD)	827 Acre for Waterfront Industry and Logistics					-	Uttar Nolbila
36	EZ	Moheshkhali EZ-3	BEZA and others (TBD)	EZ for Waterfront Industry and Logistics					-	TBD
37	Embankment	Polder Embankment Project	BWDB	Rehabilitation of Damaged Polder					-	Matarbari Island (Outer Periphery)

○ = Completed △ = Under Process

Land area allocated to various projects in Long-term Plan as per LUDP-2019

Exhibit 86: Land area allocated to various projects in Long-term Plan as per LUDP-2019

Project ID	Project Name	Area in ha	Area in acres
1	Port Phase 1 / Stage 1	97	240
	Land Area	65	161
	Land Dredging	32	79
2	Port Phase 2 / Stage 1	318	787
	Container Terminal	44	109
	Land Dredging	114	282
	Future Expansion	160	396
3	Port Stage 2	217	536
4	Access Road	(27.3 km)	-
5	Community Road	(7.3 km)	-
6	Moheshkhali Cox's Bazar Road	-	-
7	Railway	-	-
8	Logistics Center	204	504
9	CPGCBL MUSCCFP	656	1,621
10, 13	CPGCBL IPP (Semcorp) COGCBL IPP LNG Power (Mitsui)	476	1,176
11	CPGCBL IPP (Sumitomo)	535	1,322
12	BPDB Power Plant Ph1	668	1,650
	BPDB Power Plant Ph2	637	1,575
	BPDB Power Plant Ph3	981	2,423
14&21, 15&22, 23	LNG Terminal	46	114
	LNG Wharf	4	10
16	CPGCBL Solar	189	467
17	Power Grid	-	-
18	CTT Terminal	44	109
	CTT Wharf	2	5
19 20	LNG FSRU 1	-	-
	LNG FSRU 2	-	-
24	LPG Terminal	16	40
	LPG Wharf	2	5
25, 30, 31, 32	BPC SK Gas/SCCL/SPCL Port Industrial Area North	504	1,246
26	SPM Pipeline, Tank	77	190
27	Gas Pipeline	-	-
28	Gas Pipeline	-	-
29	Gas Pipeline	-	-
33	Eco Tiurism Zone	3,831	9,466
34	Moheshkhali EZ	630	1,557
35	Moheshklhali EZ-2	654	1,616
36	Moheshklhali EZ-3	320	791
37	Embankment	-	-

Project ID	Project Name	Area in ha	Area in acres
	Village Zone	738	1,824
	Consevation Area	8,761	21,648
	Hill Area/Urbanization Control Zone	7,647	18,895

Exhibit 87: MIDI - Long-term land use plan on satellite imagery

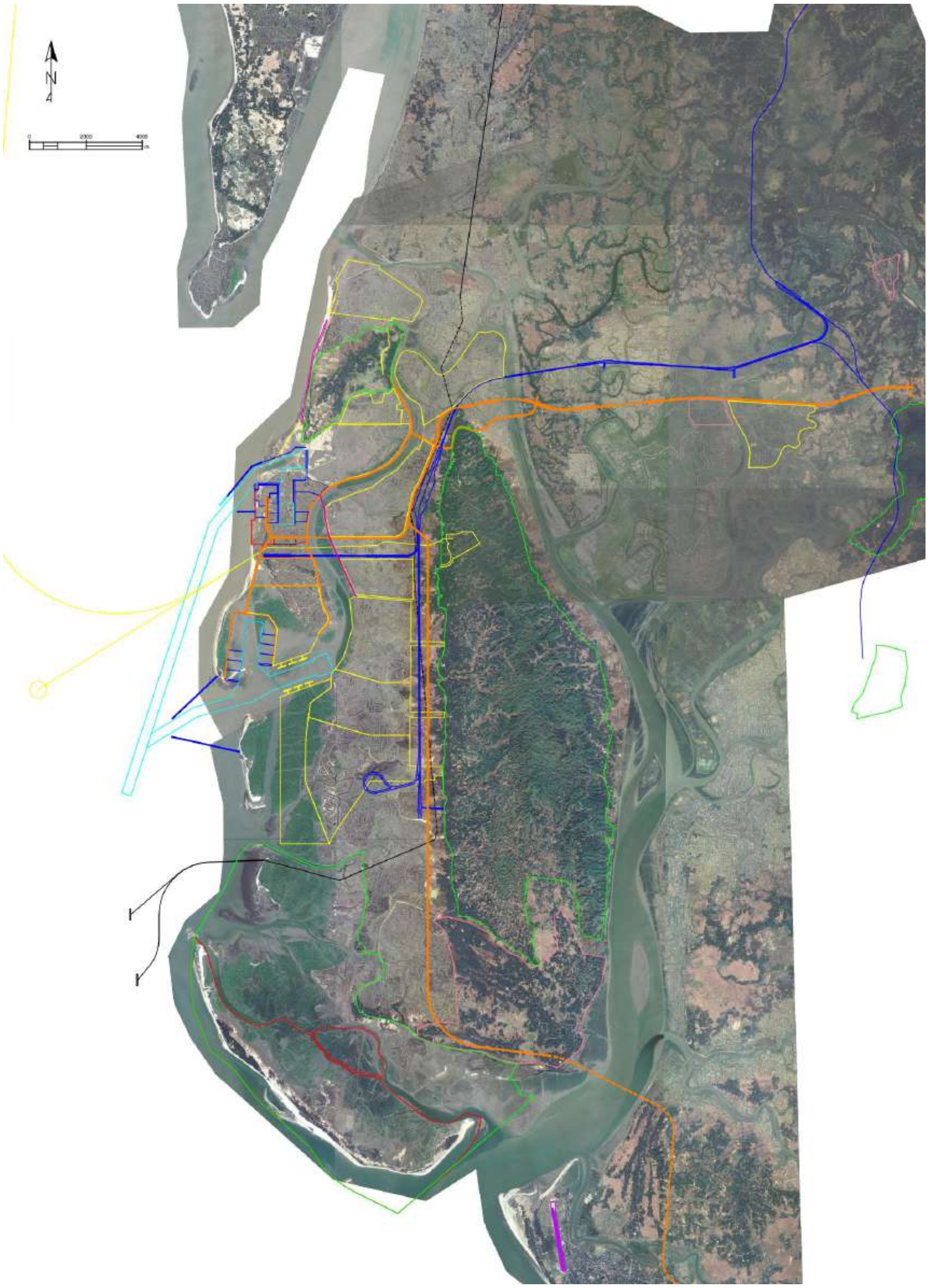


Exhibit 88: MIDI - Revised land use plan (IEZ SDP)

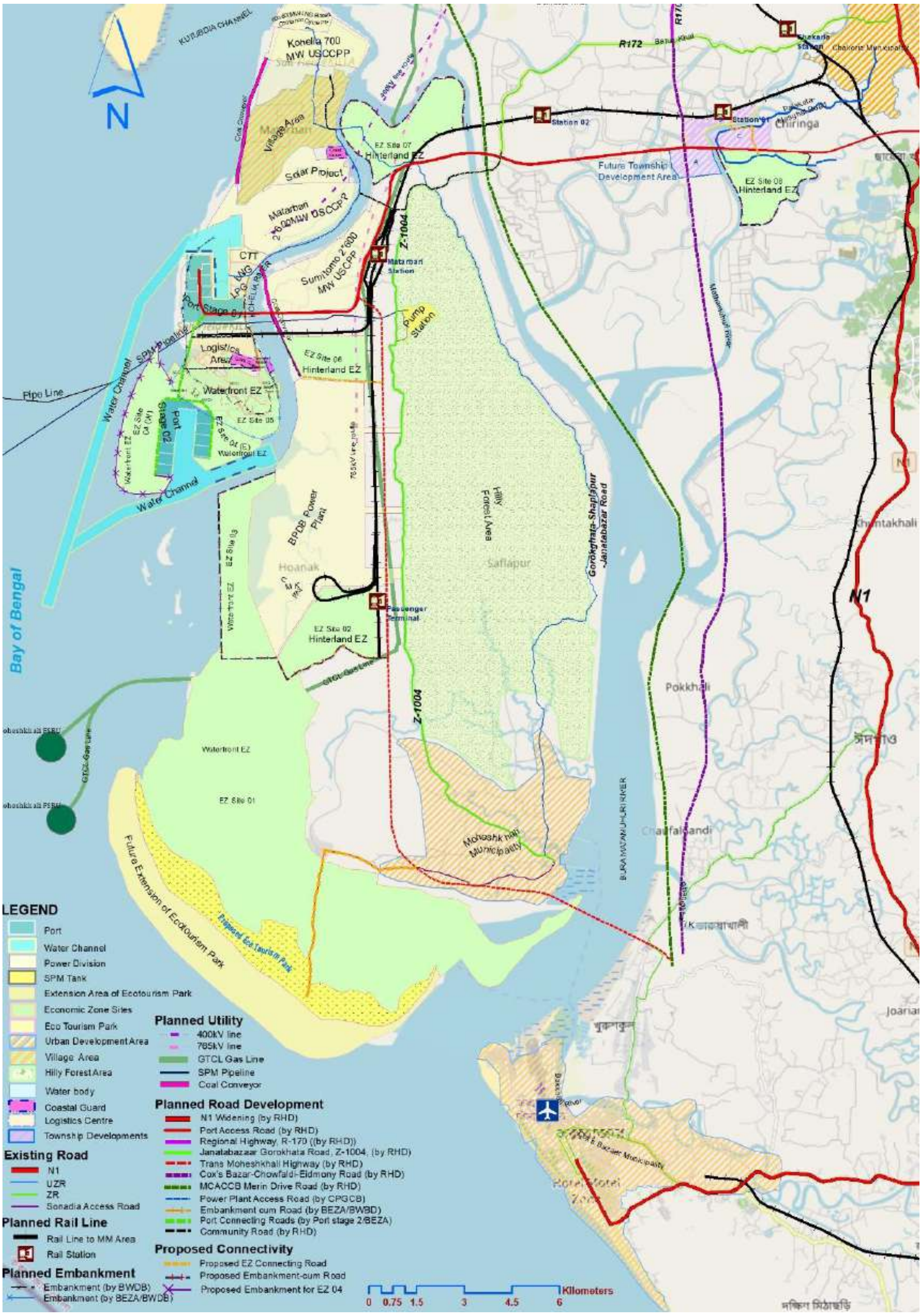
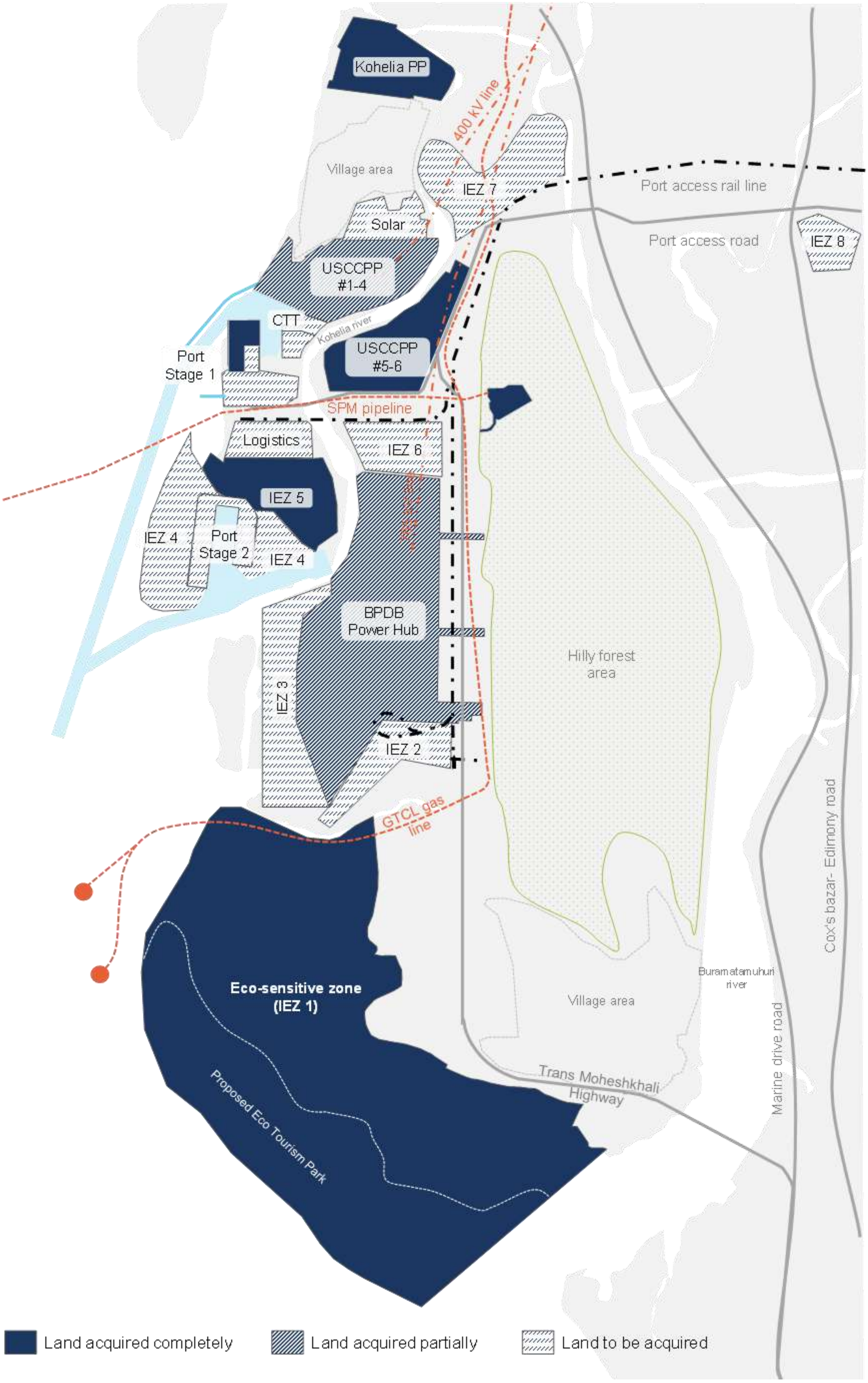


Exhibit 89: MIDI - Land acquisition status map (Current)



11.4. Project Plans

Exhibit 90: MIDI - Power Plant Master Plan

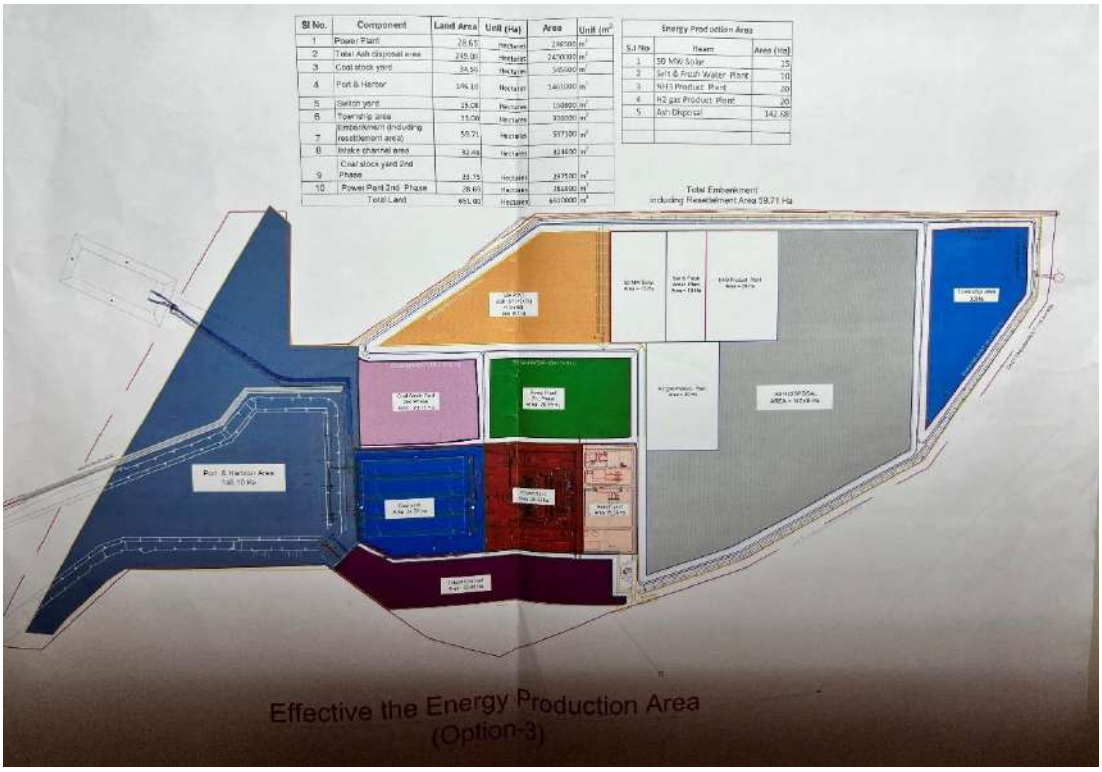


Exhibit 91: MIDI - Port (Phase 1 / Stage 1) Master Plan

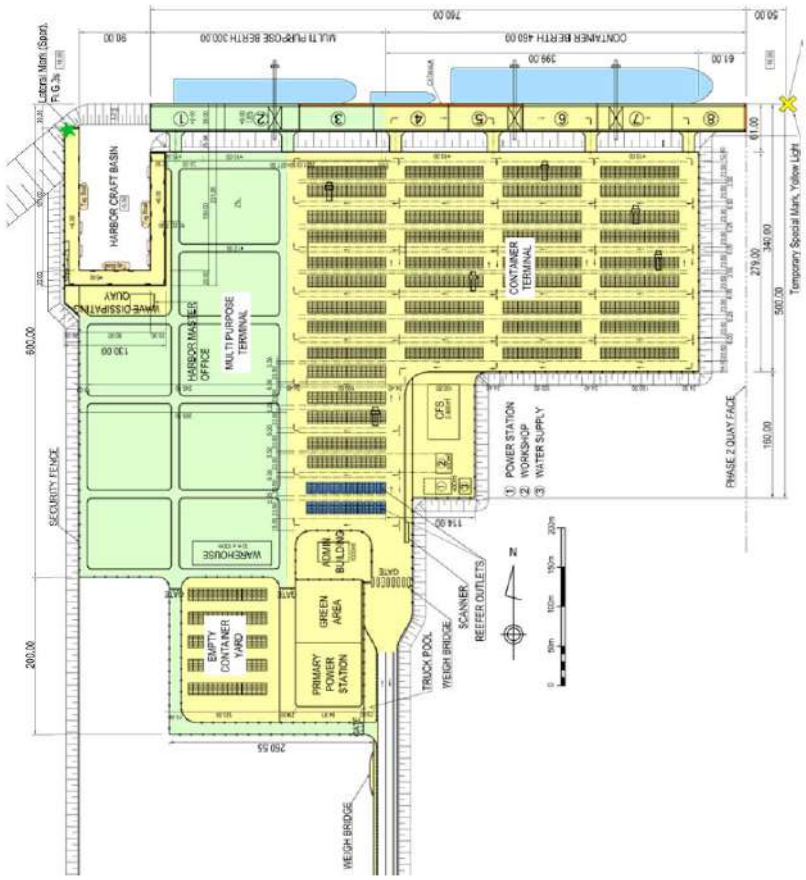
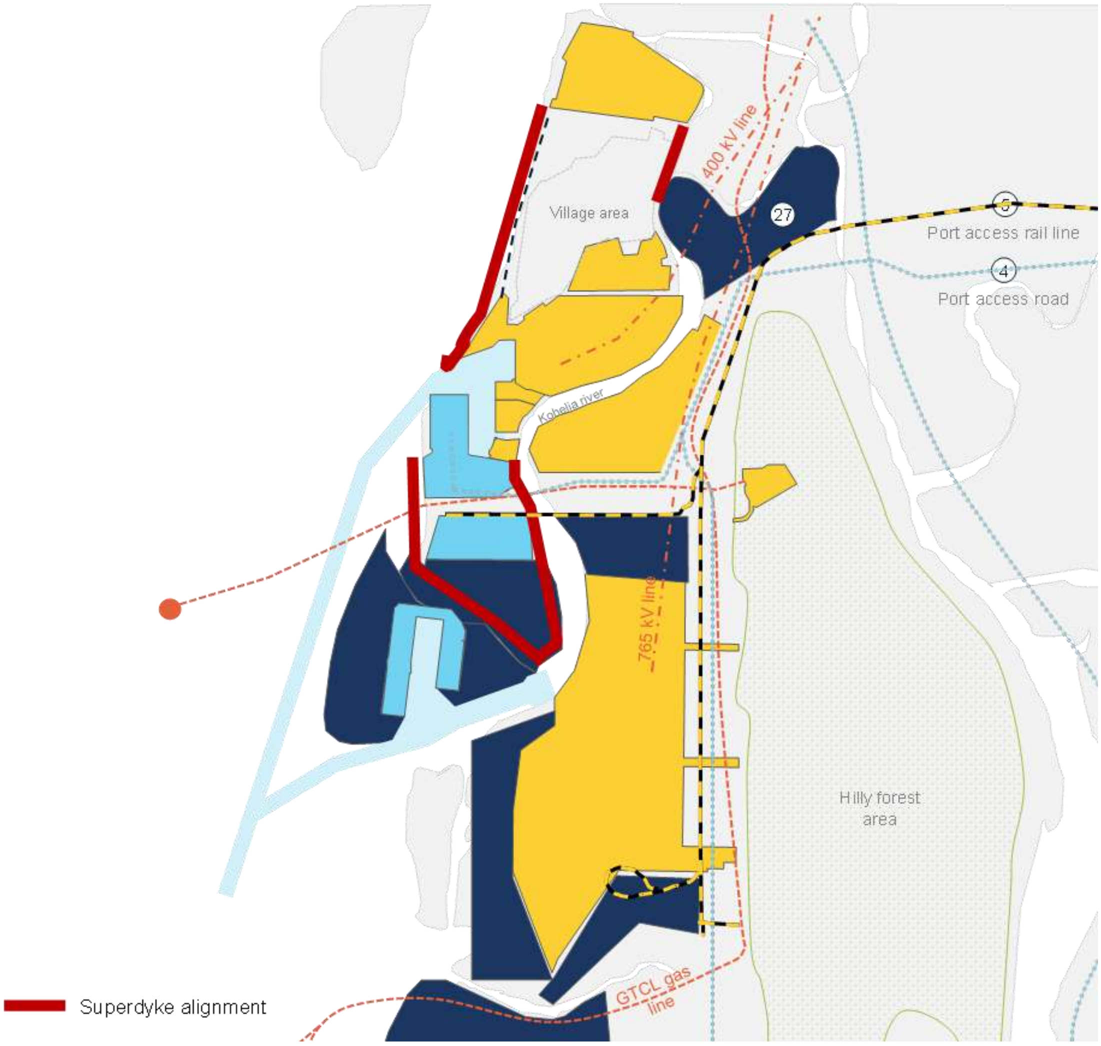


Exhibit 92: MIDI – Superdyke Plan



11.5. Site Visit - Report

On 7th February,2023 the study team visited the Matarbari Power Plant project Phase I in Matarbari-Moheshkhali region. The purpose of the visit was to understand and assess the current development status of the project along with the overall infrastructure in the region.

11.5.1. Matarbari Power Plant Project

The site visit started with a brief presentation by the CPCGBL team (along with their consultants), followed by physical visit to all project components.

Representatives -

- Md. Monowar Hossain Mojumder, Superintendent Engineer (Operation), CPGCBL
- Shoji Watanabe, Project Director for Matarbari project, Sumitomo Corporation
- Ryo Kondo, Civil engg. (Power Plant), Matarbari JVC (TEPSCO, Nippon Koei, Fichtner, SMEC)
- Tomokazu Hasegawa, Project Manager, Penta Ocean Construction Co. Ltd, Port Works and Land Development Works
- Yousuke Nakayasu, Administration manager, Penta Ocean Construction Co. Ltd, Port Works and Land Development Works

Members present – MIDI Cell

- Koji Takamatsu, Advisor- MIDI Cell

The presentation was a detailed overview of the integrated power plant project. The phase 1 is currently under development consisting of two units of 600 MW each. During the presentation, we were appraised with the timeline of the project, physical progress made and all timelines up to the COD of the power plant. Multiple other touchpoints such as CSR activities and organizational structure were covered.

Key discussions

- Currently, the expected commercial operation date of 1st unit is January 2024, and that of 2nd unit is June 2024
- Annual coal requirement for two units (1,200 MW) is 3.7 MTPA
- The project area consists of multiple components like coal yard, power block, jetties, ash pond, etc.
- The port access road is currently at a pre-construction stage, with tender evaluation ongoing
- Multiple utility developments are also being undertaken

Exhibit 93: Matarbari Power Plant project overview

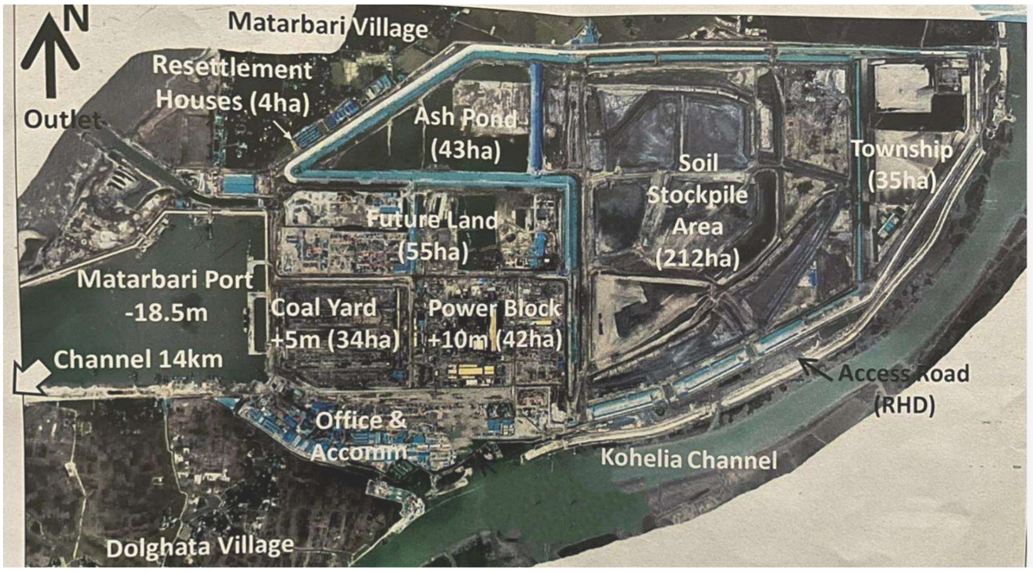
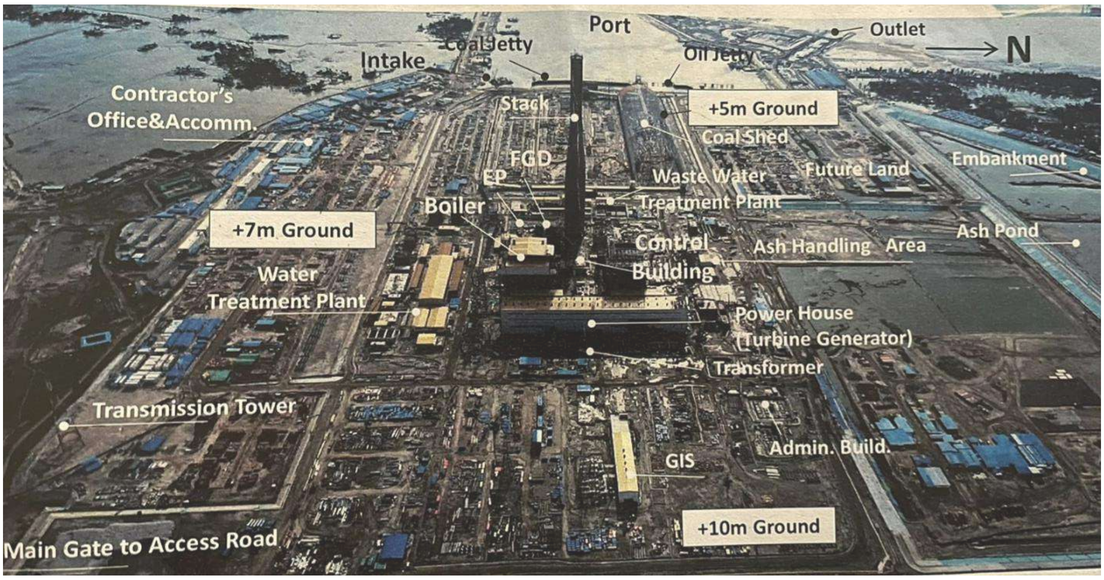


Exhibit 94: Facilities in Matarbari Power Plant



Components

- **Powerhouse**
  - Located centrally on the site, the powerhouse consists of 2x600 MW ultra-super critical units.
  - Currently, the turbines and the transformers have been installed for both 600 MW units
  - A 400kV transmission line has also been established from Madunaghat to Banshkhali to Matarbari
  - The line from Madunaghat to Banshkhali has already been energized and tested, while the line from Banshkhali to Matarbari will soon be energized within a few weeks
  - The powerhouse also consists of a central control unit
  - To avoid flooding and water damage, the entire power block including the powerhouse, chimney, boiler and transformers has been filled up to elevation of 10m

Exhibit 95: MIDI Site Pictures - Powerhouse

Exhibit 96: MIDI Site Pictures - Turbine Unit-1

Exhibit 97: MIDI Site Pictures - Central control unit

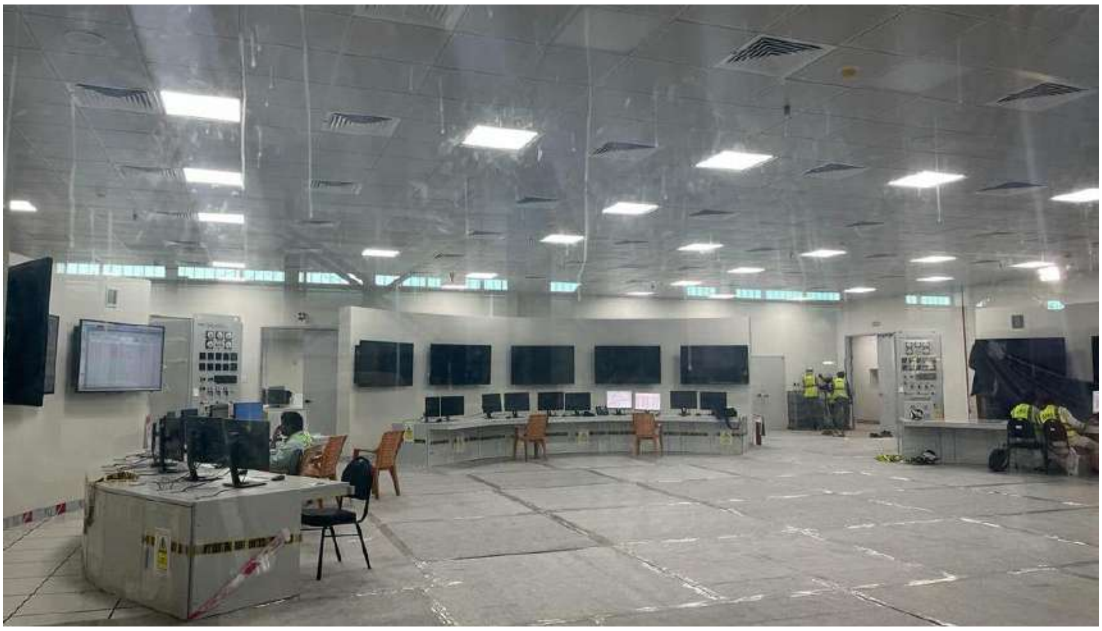


Exhibit 98: MIDI Site Pictures - Transformer Unit-1

Exhibit 99: MIDI Site Pictures - Transformer Unit-2

- **Boiler**
  The boiler is currently under construction. It will be connected with the coal yard via a conveyor belt, which is also currently being constructed.

Exhibit 100: MIDI Site Pictures - Boiler

Exhibit 101: MIDI Site Pictures - Conveyor Belt (1 of 2)

Exhibit 102: MIDI Site Pictures - Conveyor Belt (2 of 2)

- **Chimney**
  The power plant chimney is ~275 m tall structure, for venting hot smoke and gases via exhaust.

Exhibit 103: MIDI Site Pictures - Chimney (1 of 2)

Exhibit 104: MIDI Site Pictures - Chimney (2 of 2)

- **Coal Yard**
  The coal yard will have a capacity of ~8,000-10,000 cubic meters.
  - The yard consists of covered coal sheds which are being constructed and have a capacity to store ~60 days of coal
  - To avoid flooding, the coal yard land has been filled up to elevation of 5m, with an additional 3 m enclosed fence

Exhibit 105: MIDI Site Pictures - Coal yard

- **Land for future development**
  The future land was originally planned to be utilized for Phase 2 of the power plant project (another 2x600 MW units). Additionally, the soil stockpile area, spread over 212 ha is being explored for possible uses for its future utilization. The land is enclosed by embankments of up to 14m.

Exhibit 106: Land for future development (1 of 2)

Exhibit 107: Land for future development (2 of 2)

- **Ash Pond**
  Spread over ~43 ha, the ash pond has a current capacity of 5 years. It is enclosed by an embankment of 14m. Moreover, the ash pond is lined with high-density polyethylene sheets to prevent seepage of harmful substances into the ground. According to CPGCBL consultants, CPGCBL might sell ash to cement manufacturing companies, further increasing the capacity of the pond.

Exhibit 108: MIDI Site Pictures - Ash Pond

- **Power plant jetties**
  Temporary Jetties
  - Currently, there are four temporary jetties at the Matarbari port to cater to the cargo required for the project like construction material, machinery etc.
  - The cargo is majorly transported from Chittagong port
  - The depth of the temporary jetties is ~6-7 m

Exhibit 109: MIDI Site Pictures - Temporary jetties 1 and 2

Exhibit 110: MIDI Site Pictures - Temporary jetties 3 and 4

Permanent Jetties

The port also has three permanent jetties for oil, coal and heavy equipment.

- Coal jetty can handle a vessel size of ~80,000 DWT
  - The jetty will be provided with 2 unloaders / cranes with a combined offloading capacity of 3,000 tons / hour
- The oil jetty can handle a vessel size of ~10,000 DWT

Exhibit 111: MIDI Site Pictures - Coal and heavy equipment jetty

Exhibit 112: MIDI Site Pictures - Oil jetty

- **Port Channel**
  - The channel constructed by CPGCBL is ~350m in width
  - Draft
    - The average draft of the channel is 18.5 m (draft in low tide is 16 m, draft in high tide is ~2-2.4 m above average draft)
    - An average vessel size of ~80,000 DWT has been considered at low tide for port feasibility
  - The channel will be handed over to the Chittagong port Authority expected by June 2023

Synergies between Phase 1 and Phase 2 of project
  - Various infrastructure facilities like coal jetty, coal yard, ash pond, utility services, HSD tanks and townships have been created for both Phase 1 and Phase 2 of the project to create synergy and promote integrated development. CPGCBL is keen on establishing Phase 2 to efficiently utilize these existing synergies.

Exhibit 113: MIDI Site Pictures - HSD Tanks and conveyor belt (Power Plant)

11.5.2. Other sites visited

- **Matarbari Port Land**
  The Chittagong Port Authority has acquired the land; however, rehabilitation and resettlement (R&R) has not been undertaken yet. The construction of the port can only begin post relocation of the affected people on the land.

Exhibit 114: Site for Matarbari Port

- **Current Access to Matarbari**
  Current access to Matarbari via road is poor, specifically after Chakaria. The road is very narrow, and the surface contains multiple potholes and cracks. More than half an hour was taken to cover a small distance of 5 km. Moreover, the current road is seasonal in nature and shall not be functional during the monsoons. Hence, currently a new road is under construction by JICA, namely Matarbari Rangakhali Bridge over Kohelia river connecting Z1004 with Matarbari Power Plant and Dhalghata.

Exhibit 115: Current access road to Matarbari

Exhibit 116: Under construction Matarbari Rangakhali Bridge (1 of 3)

Exhibit 117: MIDI Site Pictures - Matarbari Rangakhali Bridge (2 of 3)

Exhibit 118: MIDI Site Pictures - Matarbari Rangakhali Bridge (3 of 3)

- **Chakaria Railway Station**

The team also visited the under construction Chakaria railway station. The project is funded by the Asian Development Bank and entails construction of a single-track dual gauge railway track from Dohazari -Chakaria- Cox's Bazar. RoW (right of way) for the entire track has been acquired, while the track laying is yet to begin. Establishment of port access railway shall only be done post the completion of Chakaria railway station and the planned track.

Exhibit 119: MIDI Site Pictures - Chakaria railway station project

Exhibit 120: MIDI Site Pictures - Chakaria railway station (1 of 3)

Exhibit 121: MIDI Site Pictures - Chakaria railway station (2 of 3)

Exhibit 122: MIDI Site Pictures - Chakaria railway station (3 of 3)

Exhibit 123: MIDI Site Pictures - Railway line at Chakaria Railway Station

Exhibit 124: MIDI Site Pictures - Chakaria railway station at chainage 48+965

11.6. Sonadia Island – Eco-tourism park[192]

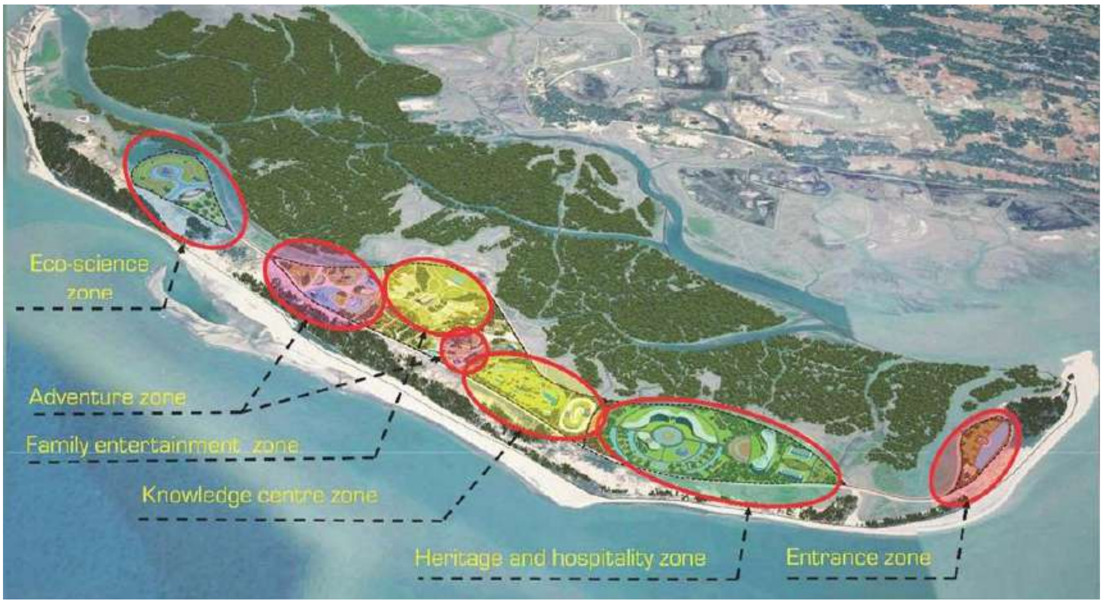
The proposed eco-tourism park is located adjacent to EZ-1 and is spread across 9,466 acres. The park is envisaged to be a "Sustainable-holistic-smart- intelligent-Eco-Tourism zone" and is expected to be completed by 2035. The presence of mangrove vegetation (>43% of area of the site), endangered species such as olive ridley turtles, migratory birds, rare crabs etc. makes it suitable for development of eco-friendly activities rather than a manufacturing based economic zone.

The feasibility study done for the eco-tourism park suggests the site to be developed into seven zones spread across ~909 acres as below.

- Entrance zone
- Adventure zone - riverside
- Adventure zone - seaside
- Eco-science zone
- Heritage zone
- Family and entertainment zone
- Hospitality zone

Further, majority of the land at the park is planned as open space to preserve the ecological aspect of the Sonadia Island. The proposed zoning plan for eco-tourism park is shown in the exhibit below.

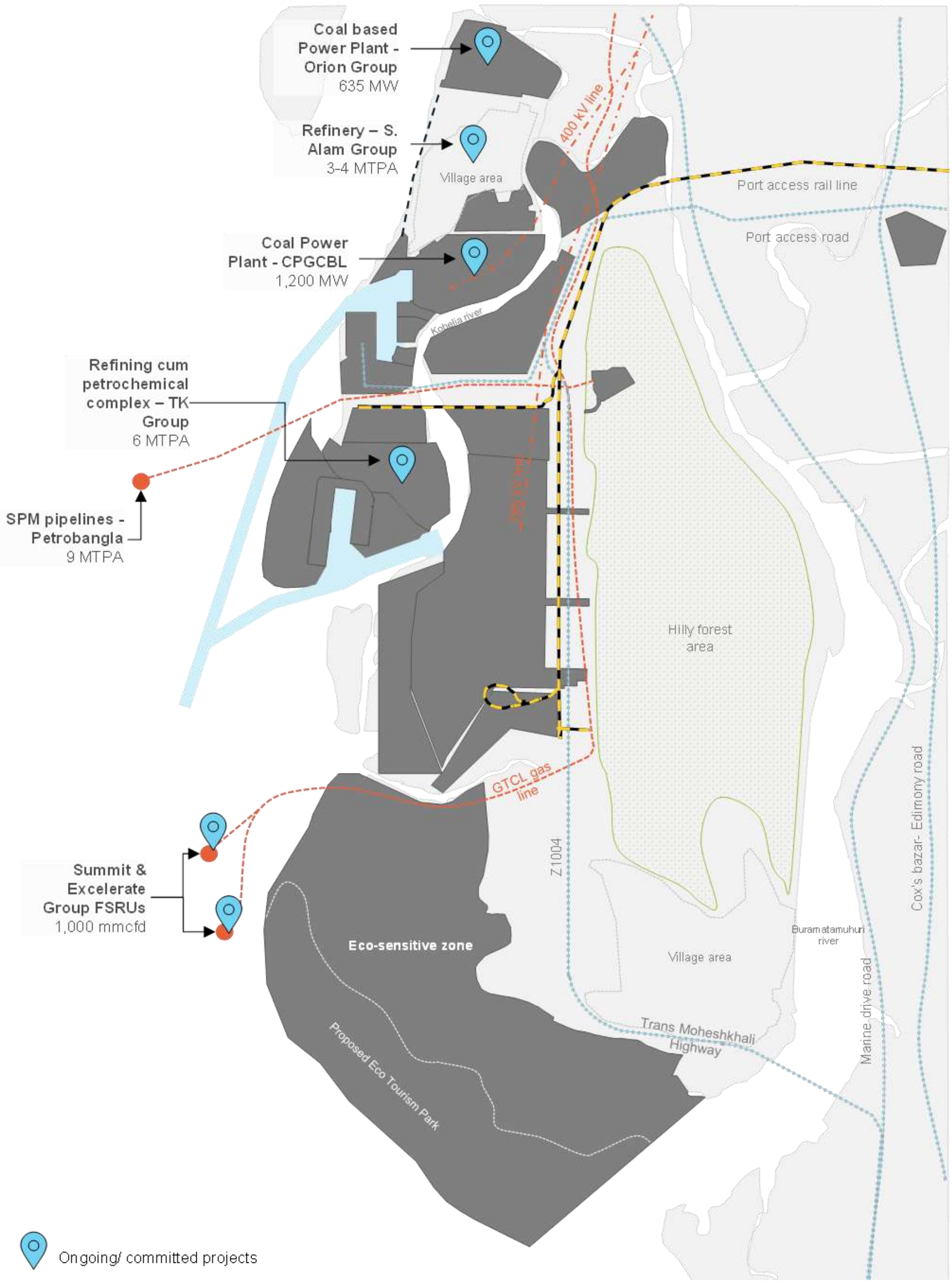
Exhibit 125: Zoning plan of Sonadia Eco-tourism Park



192 Summary based on the Feasibility Study for the Economic Zone Site in Sonadia, Moheshkhali, 2020

11.7. Ongoing/ committed projects in MIDI

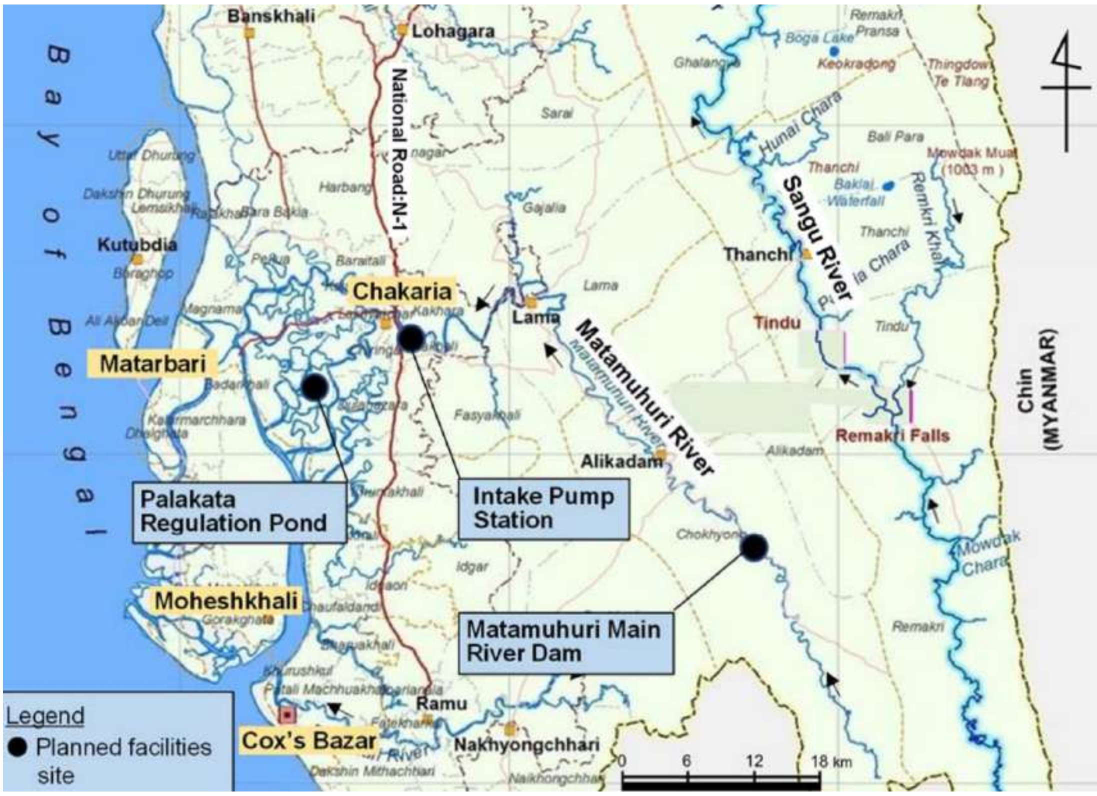
Exhibit 126: Ongoing/ committed projects in MIDI region



11.8. Proposed water supply to Matarbari region

As per Data Collection Survey on Water Resources Development in Southern Chattogram.

Exhibit 127: Proposed water supply to Matarbari region[193]



[193] Source: Data Collection Survey on Water Resources Development in Southern Chattogram

11.9. Stakeholder interactions

11.9.1. Interactions with government stakeholders

Exhibit 128: List of stakeholder interactions - Government

#	Authority	Representatives
1	MIDI Cell	• Md. Sawar Alam, Director General, Sub-regional Co-operation Cell (SRCC) / MIDI-Cell, PMO • Dr. Md. Manzurul Islam, Director-1, SRCC/MIDI-Cell • Md. Azizul Islam, Director-2, SRCC/MIDI-Cell • Koji Takamatsu, Policy Advisor, MIDI-Cell
2	BEZA	• Mohammad Hasan Arif, Joint Secretary, GM (ADM & Finance) • Mohammad Rezaul Hoque, Deputy Secretary, Manager Other relevant junior officials from BEZA
3	Ministry of Industries	• Md. Sakim Ullah, Senior Assistant Secretary, Ministry of Industries
4	CPGCBL	• Abul Kalam Azad, Executive Director Project • Depayan Paul, Executive Engineer Electrical • Rokibul Islam, Executive Engineer Design • Satoru Fujimagari, Project Manager, Matarbari JVC • Hiroshi Shinohara, TEPSCO
5	Power Division	• Md. Nazmul Abedin, Joint Secretary, Power Division
6	Ministry of Shipping	• Shaikh Md. Sharif Uddin ndc, Joint Secretary, MoS
7	BIDA	• Ms. Mohsina Yasmin, Executive Member, International Investment Promotion • Shah Mohammad Mahboob, Director General (JS)
8	Energy Division	• Ms. Shaheena Khatun, Joint Secretary, Development Wing • Md. Zakir Hossain, JS, EMRD • Mr. Rajbul Hoque, AME • Md. Shah Alam, DGM, LNG Cell • BM Khasbur Rahman, RPGCL • Biplab Ch. Das, Manager, GTCL • Chow. Sharif Zaman, Manager • Emgr. Heshman Uddin • Engr. Md. Shafiqul Islam, GM • Md. Rashedul Hasan Ripon, AE, RBGCL • Md. Mehdi Masud, DGM (PID) • Md. Sharif Hasnat, PD (SPM) • Milon Hossain, EMR • Md. Abdul Mukit, DGM
9	Bangladesh Chemical Industries Corporation (BCIC)	• Mr. Shah Md. Imdadul Haque, Chairman
10	Roads and Highways Department	• Mr. Syed Moinul Hasan, Additional Chief Engineer (Planning)
11	Rupantarita Prakritik Gas Company Ltd (RPGCL)	• Mr. Mohammad Abdul Mukit, Deputy General Manager (LNG)
12	Bangladesh Steel & Engineering Corporation (BSEC)	• Mr. Md. Shahidul Haque Bhuiyan, Chairman
13	Bangladesh Petroleum Corporation and ERL	• Mr. Hisham Uddin, Manager (Planning), BPC • Mr. Md. Sharif Hasnat GM, ERL
14	Chittagong Port Authority	-
+++ Interactions with multiple other ministries like railways, commerce, finance etc. during the MIDI workshop held in 3rd week of January		

Exhibit 129: List of attendees in Interim Workshop (19th Jan, 2023)

#	Name of attendees	Designations
	MIDI Cell	
1	Md. Sawar Alam	Director General, Sub-regional Co-operation Cell (SRCC) / MIDI-Cell, PMO
2	Md. Azizul Islam	Director-2, SRCC/MIDI-Cell
3	Koji Takamatsu	JICA Representative / Policy Advisor, MIDI Cell

4	Rumana Tanjin Antara	Senior Assistant Secretary, MIDI Cell
	GoBD representatives	
5	Hasan Arif	Joint Secretary, BEZA
6	Dr. Abdur Rahim	Joint Secretary, Finance Division
7	Anwarul Alam	Joint Secretary, Ministry of Industries
8	Md. Zakir Hossain	Joint Secretary, Energy and Mineral Resources Division
9	Mir Zahid Hasan	Joint Secretary and Project Director, Matarbari Port Development Project
10	Shaikh Sharif Uddin NDC	JS, Ministry of Shipping
11	Sheikh Sakil Uddin Ahmed	JS, Ministry of Railways
12	Nazmul Abedin	Joint Secretary, Power Division
13	Khadija Parveen	Joint Secretary, Economic Relations Division
14	-	Joint Secretary, Land Ministry
15	Shova Shahnaz	Deputy Secretary, Ministry of Civil, Aviation and Tourism
16	Farzana Ahmed	Deputy Secretary, Economic Relations Division
17	Jesmin Parvin	Deputy Secretary, Local Government Division
18	Mashhudul Kabir	Deputy Secretary, Ministry of Water Resources
19	Mohammad Monir Hossain Hawlader	Deputy Secretary, Ministry of Commerce
20	Abdul Mannaf	SE (Planning), CPGCBL
21	Md. Amin Al Parvege	Additional Deputy Commissioner (Revenue) Cox's Bazar
22	Anwar Pasha	Additional Commissioner, Chattogram
23	Rashed	Secretary, Cox Bazar's Development Authority
24	Golam Mostofa	Bangladesh Railways
25	Md. Yousuf Ali	Project Coord. Director, Additional Secretary, Matarbari
26	Md. Khijir Khan	Member, Engineering, Cox Bazar's Development Authority
27	-	APD, Matarbari Access Road
28	Aya Iwatsuji	-
29	Ahmad Mukammeludin	-

11.9.2. Interactions with private stakeholders

Exhibit 130: List of stakeholder interactions - Private

#	Company/ Group	Representatives
1	TK Group	• Mr. Mohammad Mustafa Haider - Director
2	United Group	• Mr. M Delwar Hossain - Managing Director, United Sulpho-Chemicals Ltd. • Mr. Mostak Ahmmed - Group Chief Financial Officer, United Group • Mr. Ali Reza Satter - General Manager- Supply Chain, United Hospital Ltd. • Mr. Md. Gazi Hayder Sami - Senior Executive, Corporate Affairs (Co-Ordinator)
3	Summit Group	• Mr. Azizul Quadir, Senior Manager, Project Finance • Mr. Amit Rahman, Senior Manager, Project Finance • Md. Aqil Ahmed, Manager, Project Finance
4	Doreen Group	• Mr. Mamun Hasan, CEO, Doren Shipping Line and Sr. Executive VP, Blue Ocean Wave Ship Management • Mr. Muniruzzaman Khan, Director Banking & Investment • Mr. Riyadh Hossain, Group Head of Overseas Affairs
5	S. Alam Group	• Mr. Subrata Bhowmik, ED Finance
6	Butterfly Group	• Mr. Mokbulla Huda Chowdhury, Sales Director, LG-Butterfly Group [previously with Walton and Singer groups]
7	Anwar Group	• Mr. Hossain Khaled, MD, Automobiles, Steel, Jute and Real Estate division of Anwar Group
8	BSRM Group	• Mr. Tapan Sengtupa, Joint MD, BSRM • Mr. Shekhar Ranjan Kar FCA, Group CFO & Company Secretary
9	Orion Group	• Mr. Anand Mishra, AVP, Engineering • Md. Abduhu Ruhullah, Director
10	KAFCO	• Mr. Habibullah Monju, FCA, Chief Financial Officer
11	Itochu Corporation	• Mr. Tetsuro Kano, Chief Representative/ General Manager • Mr. Aoto Watanbe, Manager, Automobile and Machinery • Md. Shafiqur Rahman, Senior Manager, Planning and Coordination
12	Berger Paints	• Mr. Anjan Sircar, MD Berger Paints Nigeria and Ex-CEO Aqua Paints Bangladesh
13	Bashundhara Cement	• Mr. K.M. Moshfewul Alam, Head of cement plant

#	Company/ Group	Representatives
14	Bangladesh Edible Oil Corporation	• Mr. Hossen Sazzad, Supply Chain Manager
15	Lafarge Holcim	• Mr. Iqbal Chowdhury, Chief Operating Officer • Mr. Tamjid Hasan, Senior Procurement Manager
16	City Group	• Mr. Mahboob Chowdhury, CEO, Eucalyptus Group (Part of City Group)
17	Uttara Group of Industries	• Mr. BL Modi, Chairman
	Confidence Group	• Mr. Imran Karim, Vice Chairman • Mr. Adeeb Aziz, Chief Investment Officer
18	JFE Steel Corporation	-
19	JETRO	-

11.9.3. Other interactions

#	Company/ Group	Category
1	P&P Enterprise	Trader – Cement clinker
2	Steel Times Pvt. Ltd.	Trader – Scrap steel
3	Tower Freight Logistics Limited	C&F Company
4	Cargostar Bangladesh	C&F Company
5	Loop Freight	Freight Agent/ Forwarder
6	BALT Limited	Freight Agent/ Forwarder

11.9.4. Participants during Final Workshops

Government Stakeholder Workshop
Held on: 28th March 2023
Venue: Hotel Pan Pacific, Sonargaon
Chaired by: SDG Coordinator, Prime Minister's Office

Exhibit 131: List of participants in Final Workshop - Government

Name	Designation	Organization
Md. Mostafa Kamal	Secretary	Ministry of Shipping
Ichiguchi Tomohide	Country Representative	JICA Bangladesh
Md. Sarwar Alam	DG (SRCC)	PMO
Habibur Rahman	Joint Secretary	Local Government Division
Md. Azizul Islam	Director, PMO	PMO
Md. Nurul Alam	Additional Secretary	Power Division
Tahmina Yeasmin	Joint Secretary	Energy and Mineral Resources Division
Mohammad Hasan Arif	Joint Secretary	BEZA
Kabir Ahamed	Joint Chief	Physical Infrastructure Division, Planning Commission
TKM Mushfiqur Rahman	Deputy Secretary	Finance Division
ATM Azharul Islam	Deputy Secretary	Ministry of Land
Md. Faizul Alam	…	Energypac
Md. Harun Ar Rashid	Advisor	Energypac
Novera Mogeen	…	MIDI Cell
Ahmad Mukammiluddin	Sr. Consultant	MIDI Cell
Koji Takamatsu	Policy Advisor	MIDI Cell, PMO

Eiji Yamada	Representative	JICA
Shota Seto	Representative	JICA Bangladesh
Asif Hasan	Program Officer	JICA Bangladesh
Abul Kalam Azad	ED	CPGEBL
Mir Zahid Hasan	Project Director Matarbari Port Dev. Project (CPA)	CPA Ministry of Shipping
Md. Anisuzzaman Chowdhury	Sr. Performance Manager	I&CA
Md. Khalilur Rahman	Joint Secretary	Ministry of Civil Aviation and Tourism
Md. Mojibar Rahman	Joint Secretary	ERD
Mahfuza Akter	Joint Secretary	Ministry of Water Resource
Salma Hasnayen	Deputy Secretary	Ministry of Commerce
Md. Abdus Sattar	PD, SCRDP	LGED
Md. Nazmul Islam Sourav	…	JICA Advisor's office
Masatsugu Nakatsuka	…	JICA Advisor's office
Bh. G. Prasada Rao	---	DEME
Md. Zahid Hossain	Additional – Secretary	Roads and Highways Division
Suvojoy Sengupta	Partner	McKinsey & Company
Abhilesh Babel	Venture Leader & Team Leader	McKinsey & Company
Aditi Vyas	Engagement Manager	McKinsey & Company
Kaito Kawano	Associate Partner	McKinsey & Company
Agam Sachdeva	Consultant	McKinsey & Company
Sohel Ahmed	Deputy Secretary	PMO
Md. Makhzanul Islam	SAS	RTHD

Private Sector Engagement Workshop

Held on: 27th March 2023
Venue: BIDA Office, Agargaon, Dhaka
Chaired by: Chairman, BIDA

Exhibit 132: List of participants in Final Workshop - Private

Name	Designation	Organization
Lokman Hossain Miah	Executive Chairman	BIDA
Ichiguchi Tomohide	Chief Representative	JICA
Md. Sarwar Alam	Director General	PMO
Md. Ashfaqul Amin Mukut	DG	BIDA
Ms. Mohsina Yasmin	Executive Member	BIDA
Gazi AKM Fazlul Haque	Director General	BIDA
Md. Abu Sayed	Director General (JS)	BIDA
Jibon Krishna Saha Roy	DG	BIDA
Md. Saiful Islam	Law Officer	BIDA
Proshanta Kumar Mandal	Public Relations Officer	BIDA

Name	Designation	Organization
Shah Mohammad Makbah	DG	BIDA
Koji Takamatzu	Policy Advisor	MIDI Cell
Ahmad Mukammaliddin	Sr. Consultant	MIDI Cell/JICA/PMO
Shota Seto	…	JICA Bangladesh
Eiji Yamada	…	JICA Bangladesh
Asif Hasan	Program Officer	JICA Bangladesh
Suvojoy Sengupta	Partner	McKinsey & Company
Abhilesh Babel	Venture Leader	McKinsey & Company
Aditi Vyas	Engagement Manager	McKinsey & Company
Kaito Kawano	Associate Partner	McKinsey & Company
Agam Sachdeva	Consultant	McKinsey & Company
Manabu Sugawara	Country Manager	Marubeni Corporation
Kawai Hikari	...	Marubeni Dhaka
Abdul Haque	Advisor	FBCCI
Monowar Hossain Akhand	Deputy Advisor	Meghna Group of Industries – MGI
Asif Ayub	Joint Sec. General	MCCI
ASM Waheduzzamam	Senior Legal Counsel	Marico Bangladesh Ltd.
Shah Badar Oddin Akhand	...	Butterfly Group
Yuji Ando	Country Representative	JETRO Bangladesh
Shariful Alam	Country Chairperson	Mitsui & Co.
Myung Ho Lee	JCI AD	Mitsubishi Corporation
Mohammad Akramuzzaman	Chief Finance Officer	Samuda Group
Md. Shafiqur Rahman	Senior Manager, Planning and Coordination Department	ITOCHU Dhaka Office
Atsushi Hirakuri	GM	Sojitz Corporation Bangladesh Liaison Office
Alif Noor	Head of Liaison and Logistics	Reliance – JERA
Md. Feroze Hossain	Assistant Manager	Abul Khair Steel
Syed Riyadh Hossain	Head of Overseas Affairs and Investments	Doreen Group
Dr. Md. Neyamul Islam	First Secretary Custom Exceptions and Projects	NBR
Mohammad Sarwar Alan	Manager	ITOCHU Corporation
Yoshmasa Takashi	Chief Representative	Nippon Steel Trading Corporation
Atsushi Saeki	Deputy General Manager	Sumitomo Corporation
Md. Taufique Imam	Business Development	Summit Group
Azizul Quadir	Senior Manager	Summit Corporation Limited
Amit Rahman	Senior Manager	Summit Corporation LTD
Noor Uddin	MD	Summit Bibiyana Power Company LTD
Md. Rezaul Islam	Administration Manager	Ashok Leyland LTD
Toru Mori	...	Toyota Tsusho Corporation, Dhaka, Liaison Office

Name	Designation	Organization
Mohammad Monir Hossain	Head of Corporate Strategy and Projects	BSRM Group
Murtaza Hussain	Department Manager, Business Excellence Corporate Strategy and Projects	BSRM Group
Asif Ahmad	Deputy General Manager	Mitsubishi Corporation
Fahim Hossain	Business Manager	Mitsubishi Corporation
Sk. Mukitul Islam	Joint Director	Bangladesh Bank
S.M. Kamruzzaman	Manager, Administration	BEXIMCO Ltd.
Md. Gazi Hayder	…	United Group
Sonrar	Business Development Executive	Abul Khair Steel
Md. Shanzidun Rahman	Business Development Executive	Abul Khair Steel
Md. Rashedul Iknam	AGM	Bashundhara Paper
Md. Ashikur Rahman	Executive, Regulatory	Bashundhara Food
Md. Maruf Hossain	Sr. Executive, PSS	Toggi Green Ship Building and Recycling Industries Ltd.

11.9.5. Key discussions during Final Workshop on 27-28 March 2023

Private Sector Engagement Workshop

Held on: 27th March 2023
Venue: BIDA Office, Agargaon, Dhaka
Chaired by: Chairman, BIDA

Key Takeaways & Suggestions:

- Private sector players echoed the potential and significance of the MIDI project in aiding logistics-led economic growth of Bangladesh.
- The private sector also confirmed their interest in investments in the project and showed visible excitement for the project to come live soon.
- The participants expressed interest in clean energy investments at MIDI – Renewable energy, CCU, Hydrogen, Ammonia. It was suggested that MIDI can also be the pilot ground for future technologies like hydrogen / ammonia with small scale prototypes.
- The private sector players reinforced need for planning infra augmentation in an integrated and planned manner (eg. – power transmission capacity to be developed in sync with generation capacity).
- They also showed interest in bulk / material manufacturing sectors at MIDI. It was suggested that heavy industries should be planned closer to port for faster logistics access.
- Participants expressed their faith that Matarbari Port will make Bangladesh a part of international shipping routes, which will enable reduction in logistics costs and lead times, eventually helping Bangladesh's exports become regionally competitive. This will be crucial as Bangladesh moves out of LDC status.
- Participants stressed on regional impact of Matarbari (e.g. - neighbouring regions like NE India) and the role Matarbari Port can play in socio-economic growth of these region.
- The private sector echoed some necessary institutional enablers which will be required to make MIDI a successful initiative:
  - Master plan of MIDI should be prioritized and completed at earliest.

- Clear policy on land allotment across manufacturing, power & energy hubs.
- MIDI Authority should be formed at earliest to speed up ease of doing business.
- Sector-specific tailored policies needed to ensure needs of each sector are addressed (e.g. automobile assembly)
- Funding reforms are needed in Bangladesh to enable large funds from loan banks which currently don't have capacity to issue large LCs.

Government Stakeholder Workshop

Held on: 28th March 2023
Venue: Hotel Pan Pacific, Sonargaon
Chaired by: SDG Coordinator, Prime Minister's Office

Key Suggestions:

- Collaboration between govt. stakeholders important to drive the project (eg. water network require for EZ5).
- Talent attraction is an important factor.
- Awareness of MIDI within govt. departments may be important to speed up implementation.
- Master plan should be prioritized.
- Resettlement of existing local population / salt pan cultivators.
- Cancellation of Phase 2 Power Plant (1.2 GW) would increase tariff of Ph 1 plant and make it less attractive.

11.10. Documents Reviewed

#	Document name	Description	Authority	Document Date
Sector Development Plans				
1	Energy SDP	SDP of Bangladesh Petroleum Corporation (BPC) at Moheshkhali-Matarbari Area	Energy and Mineral Resources Division of Ministry of Power, Energy and Mineral Resources	August 2019
2	Power SDP	SDP of Power division in Moheshkhali- Matarbari area	Power Division of Ministry of Power, Energy and Mineral Resources	November 2019
3	Rail SDP	Development Plan of Rail Link to Matarbari/Moheshkhali	Ministry of Railways	December 2019
4	Port SDP	Sector Development Plan for Ports	-	2019
5	Road SDP	Sectoral Development Plan of Roads and Highway Department for Moheshkhali and Matarbari Area	Roads and Highway Department, Ministry of Road transport and Bridges	2019
6	Industry Economic Zones SDP	Industrial and Economic Zones Sector Development Plan (IEZ-SDP)	BEZA	2021
		Revised Map of LUP (long term) for IEZs	BEZA	
		Draft and Final Report - Consultancy Services for Industrial and Economic Zones Sector Development Plan (IEZ-SDP) for Moheshkhali - Matarbari Integrated Infrastructure Development Initiative (MIDI)	BEZA	
		Presentation on Draft of Industrial and Economic Zone Sector Development Plan	BEZA	
Surveys				
7	Data Collection Survey on Integrated Development for Southern Chittagong Region	Final report on Data Collection Survey on Integrated Development for Southern Chittagong Region in The People's Republic of Bangladesh	JICA	September 2016
8	Data Collection Survey on Matarbari Port Development	Final Report - Data Collection Survey on the Matarbari Port Development in People's Republic of Bangladesh	JICA	December 2017
9	Preparatory Survey on Matarbari Port Development	Final report on Preparatory Survey on Matarbari Port Development Project in the People's Republic of Bangladesh on Port and Road Development, Environmental and Social Considerations, Economic and Financial Analysis of the investment and conclusions and recommendations	JICA	December 2018
10	Land Use and Development Planning Survey of Moheshkhali and Matarbari Area	Final report of People's Republic of Bangladesh Land Use and Development Planning Survey of Moheshkhali and Matarbari Area in the People's Republic of Bangladesh	JICA	August 2019
11	Preparatory Survey on Southern Chattogram Regional Development Project	Preparatory Survey on Southern Chattogram Regional Development Project	JICA	February 2022

#	Document name	Description	Authority	Document Date
12	Data Collection Survey for strengthening framework on operation and implementation of MIDI	Final Report on the Data Collection Survey for strengthening framework on operation and implementation of MIDI	JICA	July 2022
13	Data Collection Survey on Water Resources Development in Southern Chattogram	Final report and annexures of data Collection Survey on Water Resources Development in Southern Chattogram	JICA	August 2022
14	Preparatory Survey for Chattogram-Cox's Bazaar Highway Improvement Project	Preparatory survey for Chattogram-Cox's Bazaar Highway improvement Project in Bangladesh highlighting various aspects of the project	JICA	-
MIDI Concept				
15	Overview MIDI	Brief explanation of MIDI	JICA	June 2022
16	Project List	MIDI project list and current status	-	June 2022
Master Plan				
17	Integrated Energy and power master plan	Draft Final Report - Integrated Energy and Power Master Plan Projecting the People's Republic of Bangladesh- Version 1	JICA	September 2022
		Presentation - The Integrated Energy and Power Master Plan Project		October 2022
		Draft Final Report - Integrated Energy and Power Master Plan Projecting the People's Republic of Bangladesh- Version 1		November 2022
Government of Bangladesh documents				
18	Perspective Plan Bangladesh 2021-2041	Document outlining Bangladesh's vision towards 2041	Ministry of Planning	March 2020
19	National Industrial Policy	Policy and comparison of NIP 2016 and 2022	Ministry of Industry	September 2022
BEZA Documents				
20	Sonadia draft final report	Feasibility Study for the Economic Zone Site in Sonadia, Moheshkhali	BEZA	July 2020
21	BSMSN Final master plan	Bangabandhu Sheikh Mujib Shilpanagar Master Plan	BEZA	September 2020
22	Port Module Pre-Feasibility report BSMSN	Report on supporting Bangladesh Economic Zones Authority's PPP Initiatives for Development of Economic Zone	BEZA	November 2021
23	Feasibility Study of Infrastructure Development (Gas, Electricity and Communication) at Moheshkhali Economic Zone (Dhalghata)	Report on feasibility Study of Infrastructure Development (Gas, Electricity and Communication) at Moheshkhali Economic Zone (Dhalghata)	BEZA	March 2022
Other documents				
24	Intermodal yard Chakaria	Idea on Chakaria Intermodal Yard	-	-
25	Project for Promoting Investment and Enhancing Industrial Competitiveness	Project for Promoting Investment and Enhancing Industrial Competitiveness in the People's Republic of Bangladesh	JICA	-
26	Main Feasibility Report - Rail Link to Matarbari-Moheshkhali Power Plants & Port Area	Main Feasibility Report - Rail Link to Matarbari-Moheshkhali Power Plants & Port Area: Construction of New Single Line DG Rail Link with Moheshkhali and Matarbari Proposed Power Plants	-	May 2022
27	MIDI Book	Moheshkhali – Matarbari Integrated Development	-	-

#	Document name	Description	Authority	Document Date
		Initiatives (MIDI) related Information- Minutes of meetings, MIDI CC information		
28	Coal master plan phase 1	Image of Master plan of coal power plant phase 1	-	-
29	Construction of Superdyke in MIDI area	Preliminary development project proposal for Construction of Superdyke in MIDI area	Bangladesh Water Development Board, Ministry of Water resources	September 2022
		Cost break down for the project		
30	Pre-wrap up meeting Matarbari port development project (II) Appraisal Mission	Meeting and project details of Matarbari port development project	JICA	December 2022
31	Summit Group	Summit Corporation Limited overview	-	December 2022

11.10.1. Key takeaways from Integrated Energy Power & Master Plan

Source: Draft Final Report, Nov’22

- **Power Demand and related assumptions**

Exhibit 133: Power supply outlook

Para 1, Table 4.3-1, Section 4.3.1, Page-60

With high-speed industrialization and income growth, electricity demand will grow fastest among the energy sources. The requirement for power supply will expand 7.38-folds in PP 2041 case between 2019 and 2050, and 5.91-folds in In-Between case. At present, 91.3% of the power supply comes from thermal power plants burning conventional fossil fuels such as coal, oil and natural gas. Only 1.3% is supplied by clean energy mainly solar PVs and 7.3% comes from import. With a view to construct a low-carbon economy, every clean energy such as nuclear, hydro, solar PV, wind, CCS, ammonia, hydrogen, etc. must be introduced extensively. And thus, the conventional fossil fuel ratio including natural gas used at captive and co-generation users needs to be decreased from 91% to about 40% in 2050.

Table 4.3-1 Outlook of Power Supply

	Power Generation (TWh)				Composition				Average Growth Rate			2019 to 2051
	2019	2030	2041	2050	2019	2030	2041	2050	19-30	30-41	41-50	
PP 2041					%	%	%	%	%	%	%	times
Traditional Fuel	83.4	158.1	231.0	286.0	91.3	76.7	56.2	42.5	6.0	3.5	2.0	3.43
Clean Energy	1.1	30.5	142.8	324.2	1.3	14.8	34.7	48.1	34.8	15.1	7.7	283.11
Import (Trad Fuel)	5.1	10.8	14.6	14.6	5.6	5.2	3.6	2.2	7.1	2.8	0.0	2.88
Import (Clean Energy)	1.7	6.7	22.6	48.9	1.9	3.3	5.5	7.3	13.4	11.6	7.3	28.85
Total	91.3	206.1	411.1	673.7	100.0	100.0	100.0	100.0	7.7	6.5	4.6	7.38
In-Between					%	%	%	%	%	%	%	times
Traditional Fuel	83.4	142.8	187.1	150.9	91.3	76.0	56.1	31.1	5.0	2.5	-1.9	1.81
Clean Energy	1.1	27.6	109.1	271.3	1.3	14.7	32.7	55.9	33.5	13.3	8.6	236.93
Import (Trad Fuel)	5.1	10.8	14.6	14.6	5.6	5.7	4.4	3.0	7.1	2.8	0.0	2.88
Import (Clean Energy)	1.7	6.7	22.6	48.9	1.9	3.6	6.8	10.1	13.4	11.6	7.3	28.85
Total	91.3	187.9	333.5	485.7	100.0	100.0	100.0	100.0	6.8	5.4	3.5	5.32

Source: JICA Study Team

Exhibit 134: Assumptions on renewable energy generation

Para 1, Table 5.3.1, Section 5.3.2, Page-73

Assumptions on renewable energy generation deployment are summarized in Table 5.3-1. which are considered in the power supply plan.

Table 5.3.1 Renewable energy generation deployment plan

Item (Unit: MW)	Availability	Advanced Technology Scenario		
		2030	2041	2050
Solar PV	20%	5,061	9,500	18,000
→Solar-park solar PV	20%	3,061	3,500	6,000
→Rooftop solar PV	18%	2,000	6,000	12,000
Solar thermal	-	0	0	0
On-shore wind	25%	750	1,575	5,000
Off-shore wind	30%	0	6,000	15,000
Marine power	-	0	0	0
Traditional biomass	80%	10	15	20
Modern biomass (Waste to Energy)	80%	93.5	150	230
Hydropower	Sub to Power Generation Plan	230	330	330

Source: JICA Study Team

- **Power Generation Capacity Additions**

Exhibit 135: Power generation capacity additions

Table 7.1-1, Section 7.1, Page-131

Table 7.1-1 Power Generation Capacity Additions and Required Investment

	Capacity Addition (GW)				Required Investmentt (US$ billion)			
	2023-2030	2031-2041	2042-2050	Total	2023-2030	2031-2041	2042-2050	Total
Gas	13.2	26.5	31.6	71.2	9.7	19.5	23.3	52.6
Gas+CCS	0.0	4.3	8.8	13.1	0.0	8.3	15.7	24.0
Coal	7.6	2.3	0.0	10.0	11.3	3.4	0.0	14.7
Oil	0.5	0.8	0.7	2.0	0.3	0.5	0.5	1.4
Fossil Fuel Total	21.3	33.9	41.1	96.3	21.3	31.8	39.5	92.6
Nuclear	2.4	2.2	2.2	6.8	7.0	6.6	6.6	20.1
Hydrogen	0.0	1.6	1.6	3.2	0.0	1.3	1.3	2.6
Ammonia	1.3	1.3	0.0	2.6	2.1	2.1	0.0	4.3
New Fuel Total	1.3	2.9	1.6	5.8	2.1	3.4	1.3	6.9
PV (Solar park)	3.1	0.4	2.5	6.0	1.2	0.2	0.7	2.1
PV (rooftop)	1.6	4.0	6.0	11.6	0.9	1.9	2.3	5.1
On-shore wind	0.8	0.8	3.4	5.0	0.8	0.9	3.6	5.3
Off-shore wind	0.0	6.0	9.0	15.0	0.0	10.8	13.7	24.4
Biomass	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.5
RE Total	5.5	11.3	21.0	37.8	3.1	13.8	20.5	37.4
Total	30.5	50.4	65.9	146.8	33.6	55.6	67.9	157.0

Source: JICA Study Team

- **Transmission Capacity**

Exhibit 136: Transmission system planning & issues

Section 1.5, Page-11,12, Appendix D- Power System

5.5 Transmission System Plan

5.5.1 Key Issues of Transmission System Planning

Regarding transmission system planning, the following three points are important and priority issues.

(1) Increase of South to North Power Flow

(2) Reliability improvement of supply network to Capital Dhaka

(3) Interconnection

The appendix contains a review of the past plans and the situation surrounding the future transmission system that serve as the background for these key issues, as well as a list of referenced reports and a map showing the zones that indicate the area, outline of 132kV, 230kV, 400 kV, and 765 kV backbone transmission network.

1.5 Transmission system planning

1) Future transmission planning up to 2041

The topics of the plan include the following points:

a. Construction of a 765 kV transmission line

In view of the present and future decline in domestic gas production, the development of a power hub based on Matarbari, Moheskhali and Payra coal fired power plants is in progress.

Construction of 765kV transmission lines from that power hub to the load centres at Dhaka, Chattogam etc. are planned. Specifically, two routes of 765 kV transmission lines, one from Moheskhali to Dhaka and the other from Patuakhali to Dhaka.

i. Construction of substations for 765/400kV transmission

b. The followings are planned:

1) For Dhaka, Chattogram and other load centres: 2 substations named Bhulta & Dhaka (South)

2) 1 substation near Mirsarai for Chattogram, Greater Cumilla and Greater Noakhali

c. Construction of International Interconnection Lines and HVDC/Back-to-back facilities

There are plans to build new interconnector lines and HVDC/Back-to-back facilities for import of power through India.

In addition to the existing Bheramara HVDC/Back to Back station, there are plans to construct HVDC/Back to Back stations at Barapukuria, Cumilla, Jamalpur and Sylhet.

d. Construction of 400 kV ring transmission line around Dhaka city.

According to the demand forecast of DPDC and DESCO, the power demand in the Dhaka region supplied by these two distribution companies is expected to be about 19,000 MW by 2041, hence there is a plan to construct a 400 kV ring transmission line around Dhaka city.

e. Measures for stable operation of Rooppur Nuclear Power Plant

According to the plan at the time of preparation of Revisiting PSMP 2016, two units of 2,400 ($2 \times 1,200$) MW Rooppur Nuclear Power Plant will be put into operation during 2025-2026 (latest plan is 2024-2025). In order to ensure a safe and reliable supply of electricity from the NPPs, a transmission line is planned to be constructed to ensure continued operation in the event of an N-2 failure of the power transmission line.

f. Measures to improve reliability of power supply to Economic Zones

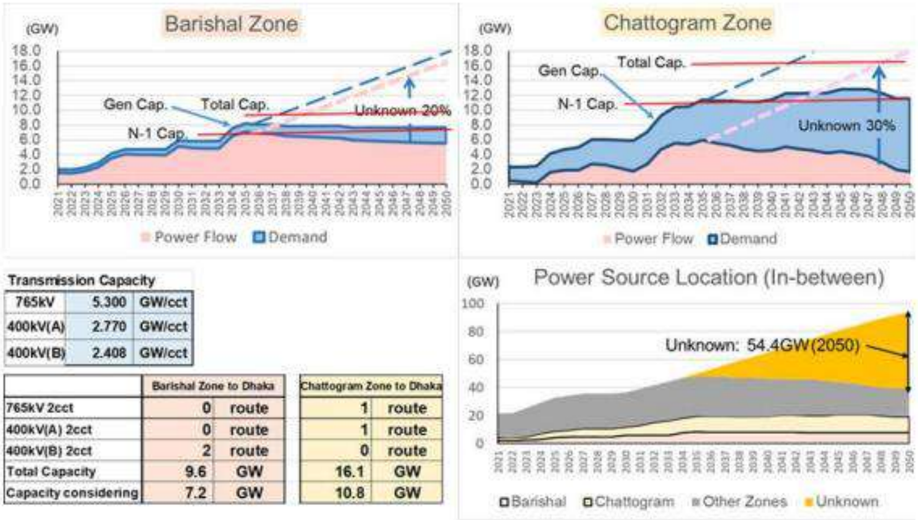
Plans are being made for expansion of transmission lines and substations for uninterrupted supply of electricity to all the EZs being implemented by Bangladesh Economic Zones Authority (BEZA).

j. Expansion of 400 kV transmission line network

In order to strengthen the power transmission system, plans have been made to construct 400kV transmission lines in all zones of the country. Every zone of the country will be connected to Dhaka with a 400 kV transmission line.

Exhibit 137: Transmission capacities in Barishal & Chattogram region

Figure- 5.5-1, Section 5.5.2, Page-93



Source: JICA Study Team

Figure 5.5-1 Transmission Capacities vs. Power Flows: Barishal & Chattogram Zones to Dhaka

- **Assumptions related to energy**

  - **Refining and LPG capacity**

Exhibit 138: Petroleum supply plan

Table 6.3-4, Section 6.3.3, Page-118

Table 6.3-4 Petroleum Supply Plan

Unit: million tons per year	2021FY	2030FY	2041FY	2050FY
Total liquid fuel demand	**12.3**	**17.5**	**30.4**	**43.1**
Refinery production	**2.0**	**5.0**	**5.0**	**8.5**
ERL-1	1.5	1.5	1.5	
ERL-2		3.0	3.0	3.0
ERL-3 (replace ERL-1)				5.0
Other small refineries	0.5	0.5	0.5	0.5
Product import (excl LPG)	**8.9**	**10.0**	**20.4**	**24.6**
BPC@Chittagong	4.5	5.0	5.0	5.0
IBFPL		1.0	1.3	1.3
SPM-1@Chittagong		3.0	9.0	9.0
New SPM@TBD (excl crude oil)			5.1	9.3
HSD/FO for IPP	4.4	1.0	0.0	0.0
LPG	**1.4**	**2.5**	**5.0**	**10.0**
Existing LPG terminal	1.4	1.5	2.0	2.0
ERL	0.0	0.1	0.1	0.2
New LPG Terminals@TBD		0.9	2.9	7.8

Source: JICA Study Team

- ### LNG Demand and Capacity

Exhibit 139: LNG Demand and capacity

Table 6.2-3, Section 6.2.3, Page-111, 112

Table 6.2-3 Outlook of Natural Gas Supply Balance

	2019	2022	2025	2030	2035	2040	2045	2050
Gas Demad	mmcfd	mmcfd	mmcfd	mmcfd	mmcfd	mmcfd	mmcfd	mmcfd
PP2041	2,870	2,987	2,566	3,384	4,008	4,985	5,823	8,142
In-Between	2,870	2,989	2,394	2,879	3,213	3,717	3,982	4,545
Production								
Low Risk Potential	2,494	2,217	2,160	1,980	1,680	1,290	1,070	890
High Risk Potential				200	900	930	1,080	1,230
Total	2,494	2,217	2,160	2,180	2,580	2,220	2,150	2,120
LNG Demand (mmscfd)								
PP2041: Base	376	770	406	1,204	1,428	2,765	3,673	6,022
Without High Risk Potential	376	770	406	1,404	2,328	3,695	4,753	7,252
In-Between: Base	376	772	234	699	633	1,497	1,832	2,425
Without High Risk Potential	376	772	234	899	1,533	2,427	2,912	3,655
LNG Demand (million tonnes)	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt
PP2041: Base	2.9	5.9	3.1	9.2	10.9	21.2	28.2	46.2
Without High Risk Potential	2.9	5.9	3.1	10.8	17.8	28.3	36.4	55.6
In-Between: Base	2.9	5.9	1.8	5.4	4.9	11.5	14.0	18.6
Without High Risk Potential	2.9	5.9	1.8	6.9	11.8	18.6	22.3	28.0

Source: Petrobangla/JICA Study Team

Table 6.2-3 LNG Terminal Plan

Location	Terminal	Capacity	Start-up
		MMcfd	
Moheskhali	#1 FSRU (Operating)	500 → 630	2023
	#2 FSRU (Operating)	500 → 630	2023
	#3 FSRU	500-750	2024
Payra	#4 FSRU	630-1,000	2027
Matarbari	Land-based	1,000	2028-29
Total	4010 MMcfd (30.7 million tonnes)		

Source: Hearing from gas companies

- ### Oil Demand

Exhibit 140: Oil demand outlook by sector

Table 6.3-1, Section 6.3.1, Page-116

Table 6.3-1 Oil Demand Outlook by Sector

	Total Primary Liquid Supply (million toe)				Composition				Average Growth Rate			2019 to 2051
	2019	2030	2041	2050	2019	2030	2041	2050	19-30	30-41	41-50	
PP 2041					%	%	%	%	%	%	%	times
Industry	0.4	1.0	1.8	3.2	7.0	5.8	6.0	7.5	8.9	5.6	5.2	8.13
Road	2.1	8.1	14.4	18.3	36.3	45.9	47.0	42.3	13.2	5.4	2.2	8.84
Other Transport	0.9	1.9	4.3	8.1	16.5	10.5	14.0	18.7	6.3	7.9	5.9	8.60
Residential	0.2	3.2	6.0	8.1	3.6	17.9	19.6	18.7	28.3	6.1	2.7	39.75
Commercial	0.0	0.1	0.2	0.2	0.1	0.7	0.6	0.6	33.0	4.7	2.4	49.74
Agriculture	1.1	1.6	2.7	3.8	18.7	8.9	8.7	8.7	3.5	5.0	3.2	3.52
Non-Energy	0.1	0.3	0.5	0.8	2.0	1.6	1.7	1.8	8.8	5.7	3.5	6.79
Power	1.4	1.8	0.8	0.8	23.7	10.1	2.6	1.8	2.5	-7.2	0.0	0.58
Refinery Loss	0.1	0.3	0.4	0.4	2.6	1.7	1.3	1.0	6.5	2.5	0.8	2.85
Distribution Loss, etc.	-0.6	-0.5	-0.5	-0.4	-10.6	-3.0	-1.5	-0.9	-1.1	-1.3	-1.2	0.68
Total	5.7	17.6	30.7	43.4	100.0	100.0	100.0	100.0	10.8	5.2	3.2	7.60
thousand barrels per day	112	347	603	852	(kb @ 5840MJ)							
In-Between												
Industry	0.4	1.0	1.7	2.5	7.0	5.7	5.8	6.4	8.6	4.8	4.0	9.6
Road	2.1	8.0	13.9	17.3	36.3	46.1	48.2	43.6	13.0	5.2	2.0	7.0
Other Transport	0.9	1.7	3.6	6.3	16.5	10.0	12.6	15.9	5.7	6.9	5.1	9.2
Residential	0.2	3.1	6.3	8.9	3.6	17.8	21.7	22.4	28.0	6.6	3.3	-8.0
Commercial	0.0	0.1	0.2	0.2	0.1	0.7	0.7	0.6	32.9	4.6	2.3	-8.8
Agriculture	1.1	1.5	2.3	3.0	18.7	8.6	8.1	7.7	3.1	4.2	2.4	18.0
Non-Energy	0.1	0.3	0.5	0.8	2.0	1.6	1.8	1.9	8.8	5.7	3.5	9.0
Power	1.4	1.9	0.4	0.6	23.7	10.8	1.3	1.4	2.9	-13.3	3.7	40.3
Refinery Loss	0.1	0.3	0.4	0.4	2.6	1.7	1.4	1.1	6.5	2.5	0.8	17.9
Distribution Loss, etc.	-0.6	-0.5	-0.5	-0.4	-10.6	-3.1	-1.6	-1.0	-1.1	-1.3	-1.2	34.4
Total	5.7	17.3	28.8	39.7	100.0	100.0	100.0	100.0	10.6	4.7	3.0	6.95
thousand barrels per day	112	340	565	780	(kb @ 5840MJ)							

Source: JICA Study Team

- **Expansion projects**

Exhibit 141: Expansion projects

Table 7.2-2,3, Section 7.2.2, Page-135

Table 7.2-2 Refinery Expansion Projects

Refinery Project	Location	Capacity	Onstream	Investment	Remarks
		mil.tons/year		$ million	
ERL #2 Expansion	Chittagong	3.0	2027	2,000	New build
ERL #3 Expansion	Chittagong	5.0	2041-2050	3,333	New build

Source: JICA Study Team

Table 7.2-3 Oil Products Import Terminal Projects

Projects on Product Import	Location	Capacity	Onstream	Investment	Remarks
		mil.tons/year		$ million	
SPM & Import Terminal	Moheskhali	4.5	2023	700	Expansion
SPM #2 & Import Termial	TBN	9.0+	2031-2041	700	New build
LPG Import Terminal	Moheskhali	1.0	2022-2030	305	New build
LPG #2 Import Terminal	TBN	2.0	2031-2041	610	New build
New LPG Import Terminals	TBN	5.0	2042-2050	1,525	New build
Total				3,840	

Source: JICA Study Team

- **Energy Security**

Exhibit 142: Energy security

Section 3.1, Page-60, Appendix D- Power System

The transmission system in Bangladesh so far, as described in the past master plan, can supply most electricity by allocating small-scale power plants using domestically produced natural gas in a distributed manner according to the distribution of demand. Since there was little need for long-distance power transmission, it was possible to deal with it by configuring it in a network with 230kV and 132kV power transmission lines and substations. As a result, there was no tendency to be inferior to those of other countries for the supply reliability of the transmission system and transmission loss (about 2.3% in the 2025 plan). In recent years since the latter half of the 2010s, domestically produced natural gas fuel alone cannot meet the growth in electricity demand due to economic growth, and large-scale power plants that utilize imported coal and LNG fuel will be newly constructed. Since it is located intensively in the coastal area of Bengal Bay in the south, it was necessary to transmit a large amount of electricity from the south to the north toward Dhaka, which is the center of demand, over a relatively long distance. To meet this need, construction of 400kV transmission lines is underway, and plans for construction of 765kV transmission lines are also underway. It is also planned to import not only fuel but also electricity generated by neighboring countries. Unlike large-scale imported fuel power plants located on the coast of Bengal Bay in the south, these receive power inland across national borders, thus correcting the above-mentioned bias in transmitting large amounts of power from the south to the north. On the other sense, there are also concerns about being heavily dependent on electricity imports from the perspective of energy security.

11.10.2. Key takeaways from Perspective Plan 2041

Source: Perspective Plan, Mar'20

- **Bangladesh will be a developed country, and will eliminate poverty**

Exhibit 143: Perspective on Bangladesh's growth targets

Executive summary - Page 1

As noted, two principal visions underpin the PP2041: (a) Bangladesh will be a developed country by 2041, with per capita income of over USD 12,500 in today's prices, and fully in tune with the digital world; (b) Poverty will become a thing of the past in Sonar Bangla. The transition—indeed transformation—can be realized through a process of rapid inclusive growth leading to the elimination of poverty while increasing the productive capacity, building an innovating knowledge economy and protecting the environment. The associated growth and poverty reduction targets are summarized in the table below.

Growth and Poverty targets for PP2041

Indicator	Benchmark FY20	Target FY31	Target FY41
Real GDP Growth (%)	8.2	9.0	9.9
Poverty indicators			
Extreme Poverty (%)	9.4	2.3	<1.0
Poverty (%)	18.8	7.0	<3.0

- **Bangladesh will experience an export-led growth in manufacturing**

Exhibit 144: View on sustainable balance of payments

Executive summary - Page 3,4

Sustainable Balance of Payments: PP2041 projects robust export growth on the back of export-oriented manufacturing expansion. RMG exports will continue to lead the way for much of the Plan period, though new and diversified export products will emerge as export diversification strategy begins to take hold. Home textiles, Jute and jute goods, footwear and leather goods exports are likely

- **Industry will contribute ~35% to GDP by 2041**

Exhibit 145: View on GDP (2041)

Page 90

principal focus of our industrial policy during the Perspective Plan will be to achieve structural transformation where industry's share in GDP would reach 40% of GDP by 2031 and then gradually come down to 33-35% of GDP by 2041 thereby absorbing the bulk of the labor force that was hitherto under-employed in agriculture and informal services. Furthermore, to develop a globally competitive manufacturing sector the strategy would be to provide support to infant industries with time-bound and performance-based criteria. Strategic coordination between the state and businesses in formulation and implementation of industrial policy is the accepted practice in Bangladesh.

- **10x growth in freight traffic; Bangladesh will rank amongst top 40 countries in terms of infrastructure quality**

Exhibit 146: Transport sector targets

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Table 10.1: PP2041 Transport Sector Targets

Indicators		FY2018 (Base Year)	FY2021	FY2031	FY2041
Passenger Traffic (billion passenger kilometres)	Roads	169	246	2072	4215
	Inland Water	16	23	252	843
	Railways	10	15	203	562
	Total	195	284	2527	5620
Freight Traffic (billion-tonnes kilometres)	Roads	24	31	71	177
	Inland Water	5	7	20	74
	Railways	2	3	10	44
	Total	31	41	101	295
Air Traffic: (million)	Passenger	12.40	14.30	29.1	55.97
(million ton)	Freight	0.38	0.45	0.65	1.14
Sea Port Cargo Traffic: (million)	Container	2.2	3.6	12.5	48.2
(million ton)	Tonnes	86	122	417	1612
Urban mass transit	No of cities	0	1	8	All major cities
Infrastructure quality	Country ranking	120	118	60	40
	Score	2.8	2.9	4.0	5.0

Source: GED Projections.

- **Infrastructure growth to be a key enabler for growth towards 2041**

Exhibit 147: Transport sector strategy

Executive summary – Page 15

The Transport Sector Strategy for PP2041: will focus on: (i) Strengthening long-term planning and priority setting; (ii) Improving inter-modal transport balance; (iii) Strengthening implementation capacity; (iv) Introducing a time saving electrical Urban Mass Transit / Metro Rail Network to reduce urban traffic congestion and improve the natural environment; (v) Ensuring sustainable financing of transport infrastructure; (vi) Developing and implementing key policies for ensuring quality and reliability of transport services; (vii) Strengthening management capabilities and efficiency of public transport authorities; and (viii) Implementing and operating modern transport facilities in line with the traffic needs of 2041.

11.11. Bangladesh's Competitiveness

Ease of doing Business Rankings:

Exhibit 148: Bangladesh's competitiveness in ease of doing business rankings

#	DB Indicator	Bangladesh	India	Sri Lanka	Philippines	Thailand	Vietnam
1	Starting a business	131	136	85	171	47	115
2	Dealing with construction permits	135	27	66	85	34	25
3	Getting electricity	176	22	89	32	6	27
4	Registering property	184	154	138	120	67	64
5	Getting credit	119	25	132	132	48	25
6	Protecting minority investors	72	13	28	72	3	97
7	Paying taxes	151	115	142	95	68	109
8	Trading across borders	176	68	96	113	62	104
9	Enforcing contracts	189	163	164	152	37	68
10	Resolving insolvency	154	52	94	65	24	122
	Overall DB rank	**168**	**63**	**99**	**95**	**21**	**70**

Logistics Performance Index:

The World Bank's Logistic Performance Index indicates that Bangladesh was on the lowest level compared to other growing economies like Vietnam, Philippines etc. Bangladesh scored 2.6 out of 5 while Philippines scored 2.9, India 3.2 and Vietnam 3.3.

According to the World Bank, transport represents the largest share of logistics cost and road transport is the most dominant in Bangladesh. As compared to other competitive economies like Philippines etc., the road transport rates in Bangladesh are much higher adding a constraint to exports. Road congestion also adds to this cost. According to the World Bank, logistics cost could be reduced by at least 7% to 35% sector wise, if road congestion is eliminated.

Trade Competitiveness:

Bangladesh's trade to GDP ratio was 15%, which was the lowest compared to the average of low- and middle-income countries (25%), while Vietnam was highly competitive in terms of trade openness with its export volume being much higher than the total size of its GDP, and trade to GDP ratio at 106%.

11.12. Long list of countries for benchmarking

We have followed a comprehensive methodology to identify relevant case benchmarks for upcoming EZs in MIDI region.

Step 1 – Shortlisting of relevant countries in Asia and Middle East basis size, per capita GDP, and development status

- Basis the above parameters, 9 countries were selected out of 38 countries, including India, Vietnam, Thailand, Egypt, Indonesia, Malaysia, Philippines, Sri Lanka, Oman.
- Developed countries like South Korea, UAE, China, Saudi Arabia, Singapore have not been captured.

Step 2 – Identification of leading economic hubs in select countries. ~130 hubs were identified which included key cities, industrial towns, port towns, power and energy hubs, coastal cities, etc.

Step 3 – Shortlisting of identified hubs basis:

- Proximity to port
- Location away from capital cities / major towns
- Manufacturing / industry / energy and power heavy nature (i.e., eliminating financial hubs, urban conglomerates etc.)

~22-25 hubs were shortlisted based on the above listed parameters.

Step 4 – Final selection for benchmarking basis:

- Comparable size & scale to MIDI
- Development in last 20 years – where impact is visible
- Good geographical representation across select countries
- Master planned developments with clear governance structure.

Basis the above methodology, 10 economic hubs were identified across India, Indonesia, Malaysia, Thailand, Vietnam, Sri Lanka, Egypt, and Philippines.

These include: Mundra Port & SEZ, India; Tanger Med, Morocco; Map Ta Phut Industrial Estate, Thailand; Ba Ria Vung Tau, Vietnam; Hai Phong, Vietnam; Bintulu, Malaysia; Pasir Gudang, Malaysia; Paradip port and Industrial complex, India; Suez Canal Economic Zone, Egypt; Dholera Special Investment Region, India.

We listed the countries across Asia and Middle East. Apart from size and current development status, countries between Bangladesh's current per capita GDP and projected per capita GDP as per PP 2041 were shortlisted.

Exhibit 149: Benchmarking Methodology

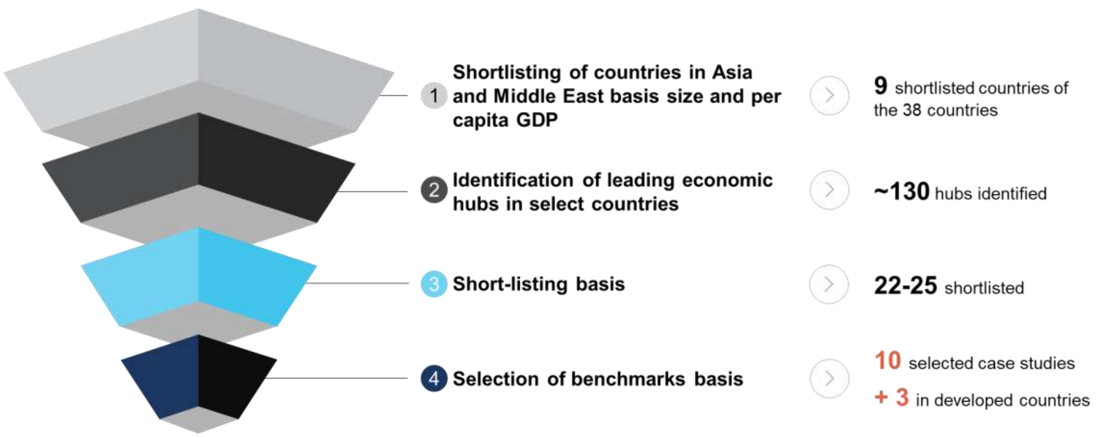


Exhibit 150: Per capita GDP of long-list of countries for benchmarking

S. No.	Country	**Per capita GDP** (PPP-current 2021 prices in USD)
1	Singapore	116,486
2	Qatar	93,521
3	UAE	66,766
4	Saudi Arabia	49,551
5	Kuwait	47,303
6	South Korea	46,918
7	Bahrain	45,411
8	Israel	43,721
9	Japan	42,940
10	Oman	31,117
11	Malaysia	29,617
12	Kazakhstan	28,600
13	China	19,338
14	Thailand	19,209
15	Maldives	18,232
16	Turkmenistan	16,194
17	Iran	15,791
18	Sri Lanka	14,127
19	Egypt	13,316
20	Indonesia	12,904
21	Mongolia	12,862
22	Vietnam	11,553
23	Bhutan	11,129
24	Lebanon	10,691
25	Iraq	10,408
26	Philippines	9,119
27	Lao	8,674
28	Uzbekistan	8,497
29	India	7,333
30	**Bangladesh**	**6,613**
31	Pakistan	5,877
32	Kyrgyzstan	5,287
33	Cambodia	4,683
34	Myanmar	4,334
35	Tajikistan	4,288
36	Nepal	4,260
37	Yemen	3,688
38	Afghanistan	2,078

11.13. Detailed Case Learnings

11.13.1. Mundra Port & SEZ, India

Evolution

Mundra port was established as a greenfield project in 2001. A PPP-DBFOT was undertaken between the state maritime board and the Adani group. The project initiated with recognition of Mundra as a Special Economic Zone, followed by creation of master plans to define land use and future developments in the region. Its vision was to create Mundra SEZ as a model industrial development of international standards, with emphasis on port-oriented activities as the hub.

Infrastructure development like integration of the port railway line with the national rail network, connecting road and private airstrip construction was undertaken in the initial years to support growing traffic at the port. With 2 container terminals, multiple berths for cargo handling, a Ro-Ro terminal, coal import terminal (world's largest), SPM and pipeline network, the period between 2001-2010 witnessed a port-centric development.

The next five years witnessed a shift in development towards other components. Manufacturing industries in the economic zone experienced a growth. At the same time, Mundra Thermal Power Plant was also established, which together with Tata's Ultra Mega Power Plant, generated ~8.5 GW of power for the region.

In the recent years, Mundra Port & SEZ has witnessed a transformation into India's largest private port and port-based multi-product SEZ. Today, it commands a leadership position in the economy being India's largest container handling port with 4 container terminals and housing world's largest coal import terminal. The port also has an LPG & LNG terminal. The construction is also underway for container terminal 5. The industrial area adjoining the port spans over 15,000 ha, with both bulk and discrete manufacturing industries. Apart from the existing coal-based power plants, there has also been a recent shift towards renewable wind energy.

Exhibit 151: Evolution of Mundra Port & SEZ

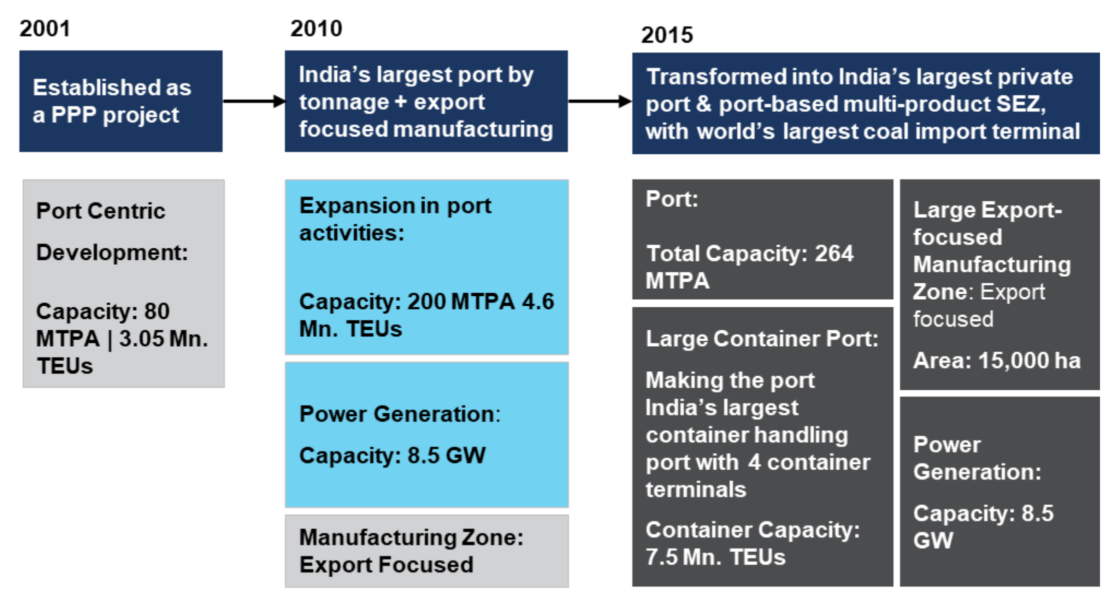


Exhibit 152: Mundra Port & SEZ

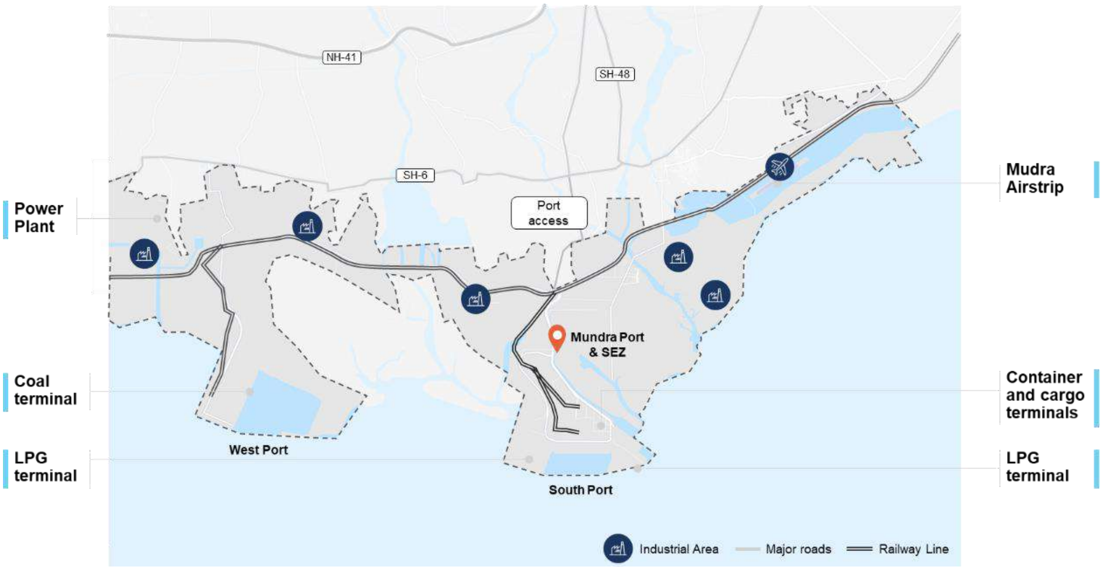


Exhibit 153: Current composition of Mundra Port & SEZ

Component	Key Information
Cargo Capacity	264 MTPA (largest in India)
- Coal Terminal	60 MTPA (~25% of India's coal imports)
- Container Terminals	7.5 Mn. TEUs (largest container handling port in India)
Port Traffic	~150.24 MTPA
LNG Terminal	5 MTPA
LPG Terminal	4 MTPA
Power Plant	~8.5 GW[194] (~2% of India's base)
Industrial Area	15,000 ha
Infrastructure	Double stack, double track, broad gauge, railway, airstrip over 45 ha

Governance

When established, Mundra Port was being developed by Gujarat Adani Ports Limited ("GAPL") on a 30-year concession basis, which was a joint venture between the Adani group and Gujarat port infrastructure development (an undertaking of Gujarat government). Later, the government divested its stake from the joint venture, and GAPL was merged with the Adani group, to form Mundra Port and Special Economic Zone Ltd. It was further renamed to Adani Ports & Special Economic Zone limited.

Today, Mundra Port & SEZ is a completely privatized project, with APSEZ granting concessions or entering into joint ventures with multiple stakeholders to operate various components in the SEZ, like container terminals etc.

[194] Including Tata's power plant in the vicinity

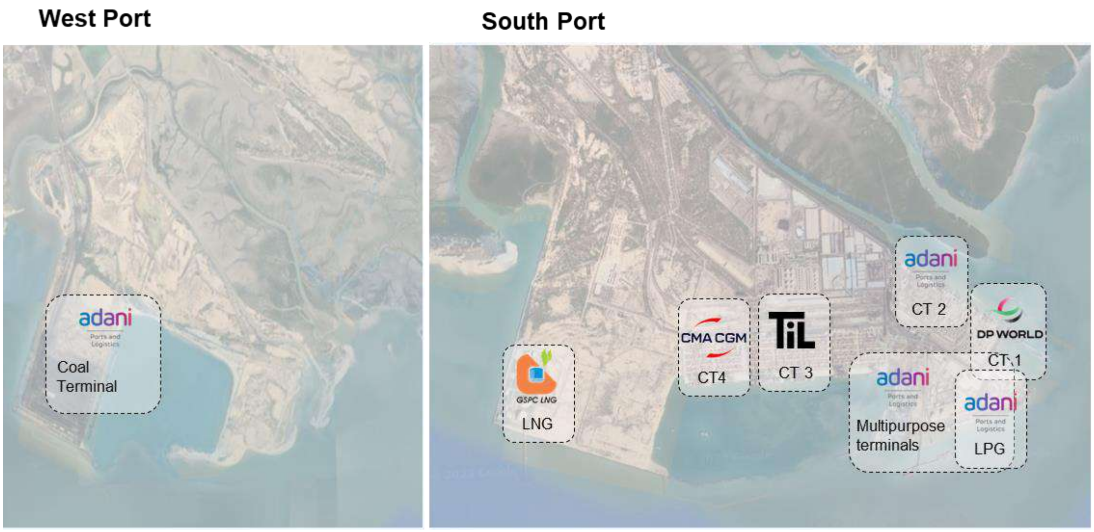
Port

- **Operations:**
  With a draft of 13-19 m, today, Mundra Port is privately owned by Adani Ports and Special Economic Zone Ltd. (APSEZ). The terminals at Mundra Port are either operated wholly by APSEZ as a joint venture or as a sub-concession by private operators. A list of operators and their respective terminals is presented below:

Exhibit 154: Port operations at Mundra Port

Operator	Berths	Commodities
Multipurpose Terminals		
adani Ports and Logistics	5 Berths	Gas & Liquid
adani Ports and Logistics	4 Berths	Bulk, Break Bulk, Containers
adani Ports and Logistics	4 Berths	Bulk, Break Bulk
Container Terminals		
DP WORLD	2 Berths	Containers
adani Ports and Logistics	2 Berths	Containers & Automobiles
TiL	4 Berths	Containers (As a JV with APSEZ)
CMA CGM	2 Berths	Containers (As a JV with APSEZ)
Other Terminals		
adani Ports and Logistics	4 Berths	Coal
adani Ports and Logistics	1 Berth	LPG
GSPC LNG	1 Berth	LNG (As a JV with APSEZ)

Exhibit 155: Terminals at Mundra Port



- **Port Traffic:**
  The port handles large amount of export-import traffic of India. In FY 21-22, Mundra port handled ~150 MTPA of traffic.

  Majority of the traffic from the adjoining industrial area is also handled there. The industrial area comprises of both bulk and discrete industries. The port is a gateway for cargo to the Northern hinterland, while the manufacturing zone is the gateway for Indian exports.

  ~40% of the traffic at Mundra Port is comprised of bulk traffic. Industries in and around the economic zone majorly import raw materials like coal, chemicals, steel & project cargo etc. to support manufacturing. The port also imports finished products like fertilizers. Mundra Port handles ~20% of India's total fertiliser imports.

Exhibit 156: Solid bulk cargo movement at Mundra Port

Bulk/ break bulk cargo: ~29 MTPA

Key raw materials for bulk industries handled at SEZ:
- Minerals
- Steel & project cargo
- Chemicals
- Coal

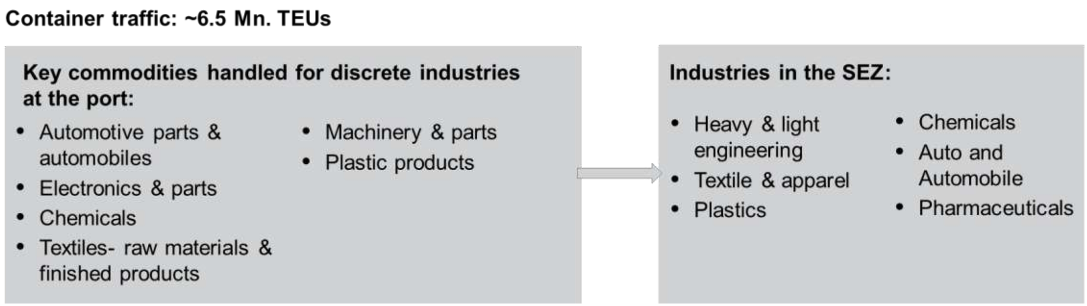
Key finished imports:
- Fertilizers

Key exports:
- Agricultural products
- Construction minerals like clinker, fly ash

Industries in the SEZ:
- Minerals & metals
- Textile & apparel
- Steel & cement
- Power plant
- Food processing industry

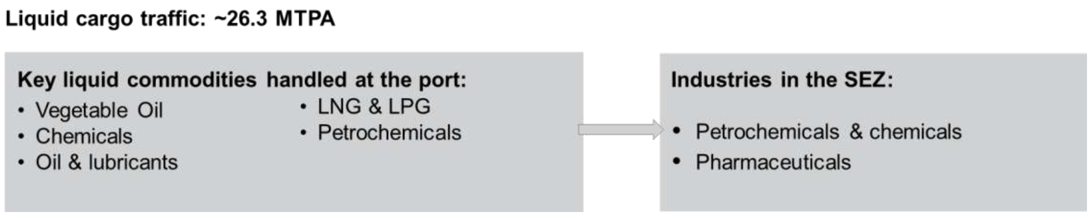
Handling ~30-35% of India's total container traffic, Mundra Port is India's largest container handling port. The port handles exports from discrete industries located in the industrial zone. These industries include textiles, automobile, pharmaceuticals, machinery etc.

Exhibit 157: Container movement at Mundra Port



Liquid cargo traffic comprises of ~18% of total port traffic. Majority of the commodities handled at the port include vegetable oil, LNG & LPG, petrochemicals, oil & lubricants amongst others.

Exhibit 158: Liquid cargo movement at Mundra Port



- **Port Infrastructure:**
  With deep draft berths and both container & multipurpose terminals, the port efficiently handles the largest bulk carriers in the world. The port has covered and open storage areas with enormous capacity. With dedicated infrastructure for specific commodities, and facilities for efficient cargo handling at all stages, Mundra Port has evolved into a world-class port with state-of-the-art infrastructure.

  Hinterland connectivity
  - **Road connectivity**
    Excellent connectivity to larger highway network, through 4 / 6 lane connecting roads linking to national (NH-8 & 8A) and state highways (SH-6 & 48)
  - **Rail connectivity**
    Linked to larger rail network through a ~60-km long double rail line and includes:
    - Handling capacity of 80 rakes/day of high axle load (25 MT)
    - Dedicated rail sidings provided for agricultural commodities, fertilizer, coal, and liquid cargo
  - **Double-stacked container movement**
    Linked to industrial and consumption hubs in N/ NW India through Indian Railways' Western Dedicated Freight Corridor project, designed for dedicated, high-throughput freight traffic. In June 2021, it piloted a double-stacked container train
  - **Airstrip**
    Mundra airstrip is licensed under private use category. Present runway is 2,200 m extendable up to 4,000 m.

Exhibit 159: Multi modal connectivity at Mundra Port

- **Container Handling**
  Mundra Port, India's largest container handling port has 4 container terminals, with a total capacity of 7.5 Mn TEUs annually. The facilities include:
  - **Berths**
    10 berths with a total quay length of >3,300m & draft up to 17m
  - **Storage**
    - Container yards at all the 4 terminals, linkage to multiple ICDs via rail
    - Including ~1,500 reefer plugs
  - **Container handling equipment**
    - ~30 Post and Super Post Panamax rail mounted quay crane
    - ~80 Rubber tire and rail mounted gantry crane, empty container handler
    - Container terminal management system to provide real time visibility and operational support, automated gate/ yard operations

Exhibit 160: Container handling at Mundra Port

- **Multi-commodity bulk handling**
  Mundra Port is India's largest commercial port, and bulk cargo comprises >40% of its total traffic. The facilities include:
  - **Berths**
    3 multipurpose terminals with 13 berths of draft >15.5 m and LoA of 180-280 m each, capable of handling ultra large cargo carriers.
  - **Storage**
    - Covered bulk warehouses of ~630,000 MT capacity for storing food grain, fertilizer, de-oiled cakes, etc.

- Open yards >1 Mn sqm area, for minerals, steel etc.
- **Cargo handling equipment**
  - Mobile harbor cranes with grab & hook operations
  - 1,000 MT per hour ship loaders
  - 3.6 km long conveyor system capable of handling import and export bulk cargo
  - Mobile hoppers, excavators, loader, trucks, for internal movement of cargo

Exhibit 161: Multi commodity bulk handling at Mundra Port

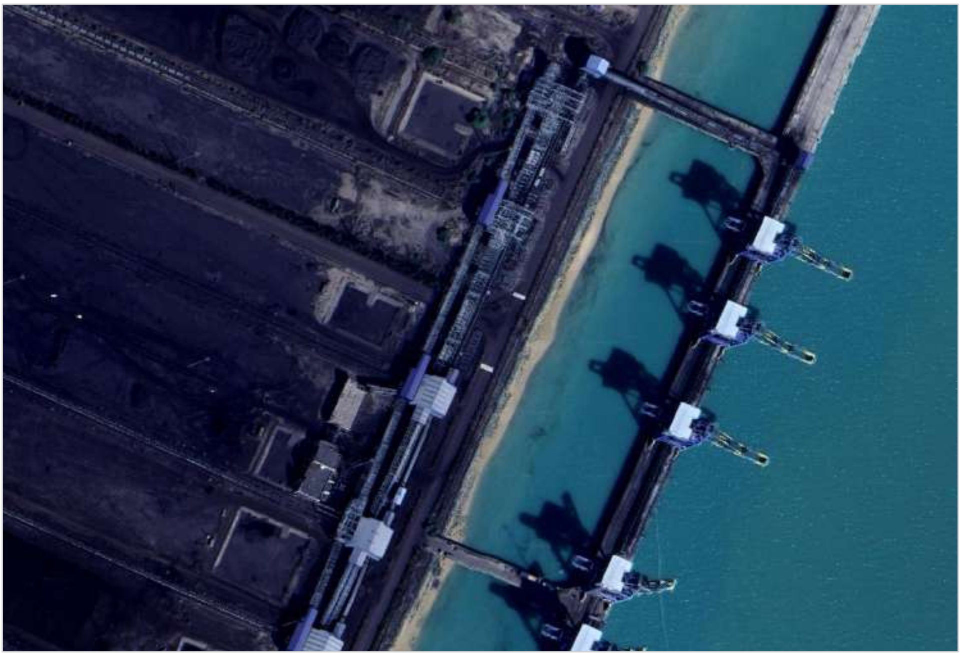
- **LNG Terminal**
  Mundra LNG import terminal was created to increase gas importing capacity in India to meet the growing demand for natural gas. The terminal has a capacity of 5 MTPA, extendable up to 20 MTPA. It includes:
  - 2 LNG storage tanks with a storage capacity of 160,000m3 each
  - Facilities: Separate berth & jetty, LNG carrier, boil-off gas handling, regasification, gas evacuation, pressurization & vaporization

Exhibit 162: LNG handling at Mundra Port

- **Coal Import Terminal**
  The coal terminal at Mundra Port is the largest in India, with ~60 MTPA capacity. This is a dedicated terminal for handling coal imports, located ~12km west of the multi-commodity terminal. It caters to 2 captive power plants (~8.6 GW) and coal trade. The facilities include:
  - **Berths**
    4 berths with total length of ~1.5 km and 19m draft, capable of handling up to 270,000 DWT vessels

- **Storage yard**
  Open yard of ~3.2 Mn MT storage capacity
- **Material handling system**
  - 7 grab-type ship unloaders of 2000 TPH capacity
  - 2 wagons loading of 4000 MT each and 3 truck loading stations capable of handling 7 trucks each
  - >20 km long conveyor capable of unloading 6,000 TPH
  - Others – stacker reclaimers, internal trucks, etc.

Exhibit 163: Coal Import terminal at Mundra Port



Incentives

The Special Economic Zone in Mundra offers high support across a lot of categories to attract investments. Some of these incentives are listed below:

Exhibit 164: Incentives offered at Mundra

Incentives	Key Strategic Questions
Tax-related benefits	• Waiving off of state levies and entry tax • 100% exemption on export profits for the first 5 years & 50 % for the next 5 years • 50% exemption on ploughed back profits for 5 years after the first 10 years • Exemption of service tax, VAT and lease tax
Custom related benefits	• Exemption of excise duty, custom duty and stamp duty • Domestic Tariff Area (DTA) supplier is eligible for export benefits on SEZ sales, enabling competitive procurement costs
Utility related benefits	• Exemption from electricity duty for 10 years from the date of commencement of operations

	Incentives	Key Strategic Questions
	Regulatory & operational benefits	• Cost competitive financing can be availed from Offshore Banking Units (OBUs) • External commercial borrowings up to US $ 500 million can be availed without any specific approvals

11.13.2. Tanger Med, Morocco

Evolution

Tanger Med was established in 1999 as a small free zone over 440 ha of land. However, owing to its ideal location and to increase Morocco's development and competitiveness, it was decided to transform Tanger Med into a large port, commercial and industrial complex.
Tanger Med was initiated with a very integrated and long-term vision, as highlighted by the king of Morocco: "We consider Tanger Med port as the core of a large port, logistics, industrial, commercial and touristic complex" … "Mission to create Tanger Med a trade hub between Africa and Europe" …And creating a "strong economic backbone, of international scale, along with free zones allowing the region to develop its rich potential and make it an integrated regional development model"

With the vision being announced, port-related construction began in Tanger Med. It was observed that presence of a leading authority to coordinate with the government, and implement the vision was important. Hence, the Tanger Med special agency was created. Master plans and land use was defined, with 1,000 ha being earmarked for port complex, and 5,000 ha for the industrial complex. The next seven years witnessed infrastructure developments, and port-related developments like establishment of container terminals and a free logistics zone for value-added activities.

In the next 5 years, there was a large-scale expansion in both port and industrial platform. The port developed multiple terminals to handle various types of commodities like hydrocarbon, bulk cargo, vehicle terminal, and a separate Ro-Ro and passenger port for trucks and people. The industrial platform witnessed establishment of Tanger Med automotive city adjoining Africa's biggest car manufacturing plant- Renault Tanger Med. A sector park for offshoring business services was also established.

Today, Tanger Med has transformed from a small free zone to an integrated port-led industrial & logistics platform with 1,100+ industrial companies. The port consists of various components like Tanger Med 1 port with 2 container terminals, railway terminal, bulk terminal, vehicle terminal and a hydrocarbon terminal; Tanger Med 2 port with 2 container terminals; a logistics free zone and finally, a Ro-Ro and passenger port. Together, they make Tanger Med the Mediterranean's highest container throughput port. The developed industrial area with mostly discrete export-focused industries has expanded to 2,000 ha with industries generating more than 59 Bn. DHS in industrial exports.

Exhibit 165: Evolution of Tanger Med

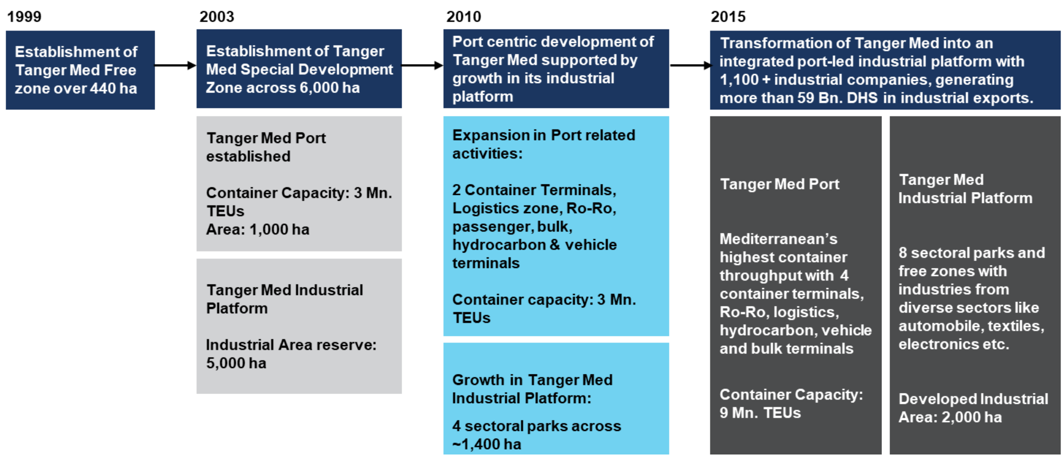


Exhibit 166: Tanger Med Port & Industrial Platform

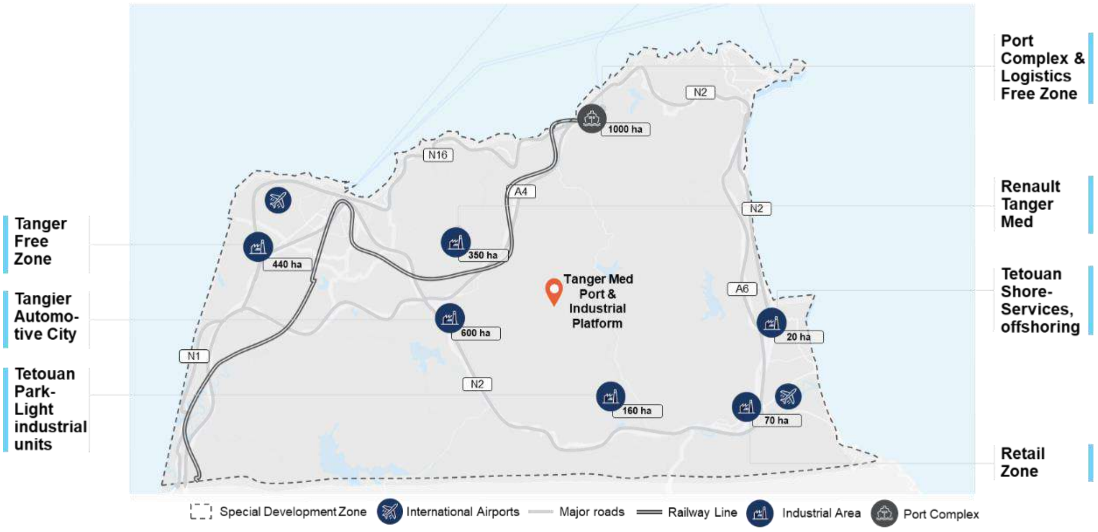


Exhibit 167: Current composition of Tanger Med Port & Industrial Platform

Component	Key Information
Container Capacity	9 Mn. TEUs (Mediterranean's highest container throughput)
Port Traffic	~101 MTPA (50% of Morocco's total port tonnage)
Port Area	1,000 ha
Industrial Area	5,000 ha (2,000 ha developed)
Infrastructure	Container railway terminal 3 lanes of 800 m with 0.4 Mn. TEU capacity

Governance

Spread across 6,000 ha, Tanger Med is planned and developed by Tanger Med Special Agency, which is a fully state-owned company formed in 2002. It includes a supervisory board management with key government stakeholders and an executive board with officials representing multiple agencies and components in the area. The supervisory board was created to facilitate external stakeholder and provide directional guidance to the project, while the executive board facilitates internal stakeholder management and drives operations.

Further, it has special purpose vehicles under it for its two verticals namely, Tanger Med Port and the industrial complex. It also includes Tanger Med Services established to support both the verticals in services like technology, engineering, and utilities.

Tanger Med's structure provides clear delineation between the roles of the two verticals and offers service level efficiency via presence of a horizontal namely Tanger Med utilities. The governance is clearly defined by the presence of a leading authority to implement a, create master plans, and mobilize funds. According to authorities at Tanger Med, the governance structure put by the government is one of the key components in achieving the strategic and ambitious objectives.

Exhibit 168: Tanger Med governance structure

Tanger Med Special Agency

Development authority to conduct studies, create development plans and mobilize funds for projects.

Supervisory Board	**Executive Board**
Highest body with members from government ministries and key external stakeholders	Body with members from Tanger Med's subsidiaries and key internal stakeholders

Port	**Industrial Area**	**Services**
Tanger Med Port Authority & Tanger Med 2 Nodal authorities to develop Tanger Med ports spread across 1,000 ha. • Planning, development and maintenance of the port • Regulatory & licensing authority • Promotion & concessioning of the port	**Tanger Med Zones** Nodal authority to develop free zones & the industrial complex spread across 5,000 ha. • Planning & development of the industrial complex • Building warehouses, organizing & maintenance • Leasing out land • Promotion of the industrial platform	**Tanger Med Engineering** Providing engineers for major infrastructural projects. **Cires Technologies** Providing technology services **Tanger Med Utilities** Providing utility and maintenance services.

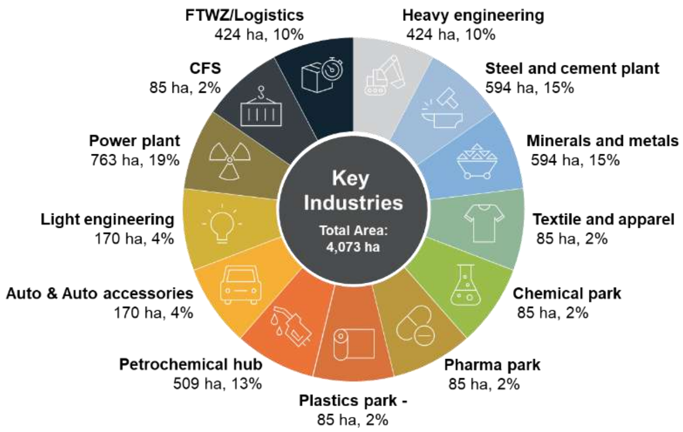
Industries

The industrial land in Mundra SEZ spans over 15,000 ha, with multiple bulk and discrete based industries like cement, chemicals, steel, edible oil processing, textile etc. It is amongst one of the biggest industrial areas in India and has been master planned as an integrated ecosystem.

The master plan outlines industrial composition of various bulk and discrete industries.

With a robust port infrastructure, multi-modal connectivity, and utility and business support related infrastructure, Mundra offers excellent investment opportunities for diversified industries.

Exhibit 169: Industrial composition at Mundra



Port

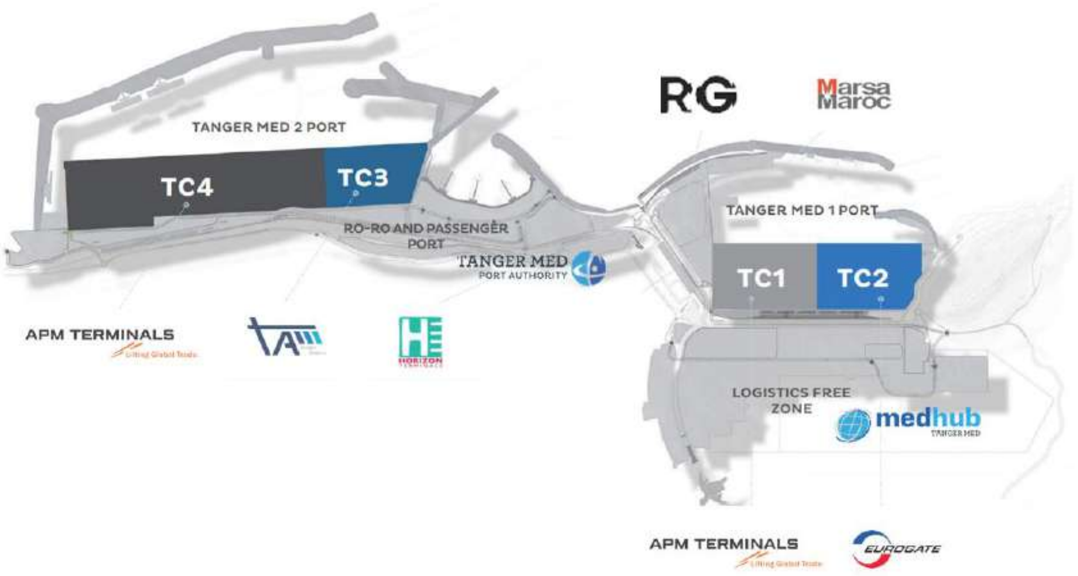
- **Operations**

With a deep water depth of 9-18 m and a port traffic of 7.17 Mn. TEUs containers and 9 MTPA of bulk, Tanger Med port is one of the biggest ports by throughput in the Mediterranean region. The port owes its success to the excellent operations carried out by world renowned operators. It is owned and operated by Tanger Med port authority and Tanger Med 2, which are Special Purpose Vehicles created to operate, maintain, and act as a concessionaire for port related activities. The terminals at Tanger Med are privately operated by world renowned operators like Eurogate, Marsa Maroc etc.

Exhibit 170: Port operations at Tanger Med

Operator	Terminal	Capacity
APM TERMINALS Lifting Global Trade	CT 1	1.5 Mn. TEUs
EUROGATE	CT 2	1.5 Mn. TEUs
TA tanger alliance	CT 3	1 Mn. TEUs
APM TERMINALS Lifting Global Trade	CT 4	5 Mn. TEUs
HORIZON TERMINALS	Hydrocarbon Terminal	15 MTPA
RG	Vehicle Terminal	1 Mn. Vehicles
Marsa Maroc	Bulk & General Cargo Terminal	0.8 MTPA
TANGER MED PORT AUTHORITY	Passenger & Ro-Ro Port	7 Mn. Passengers 0.7 Mn. Trucks
medhub TANGER MED	Logistics Zone	300 ha

Exhibit 171: Terminals at Tanger Med



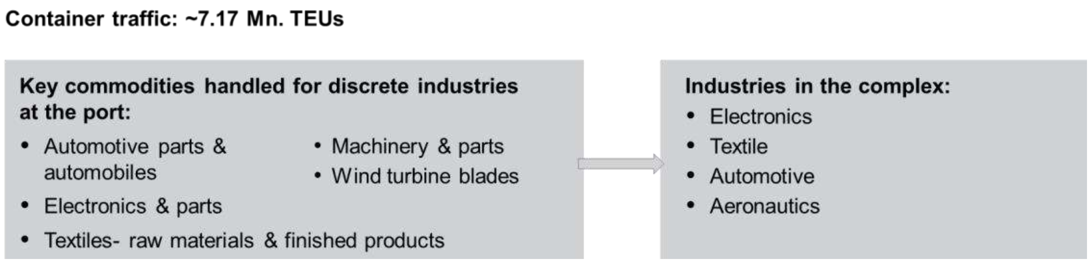
- **Port Traffic**

The port handles ~50% of Morocco's total port tonnage and is the highest container throughput port the Mediterranean region. In 2020-21, the port handled a total traffic of ~101 MTPA including containers, solid and liquid bulk.

The industries present in Tanger Med are mostly discrete export-focussed industries. Apart from handling domestic traffic, the port also caters to large amount of export traffic of the industries in the adjoining sector parks. The port is a gateway bridging Europe and Africa. The ideal location of the port at the crossroad of major maritime routes, makes it an ideal destination for large number of ships.

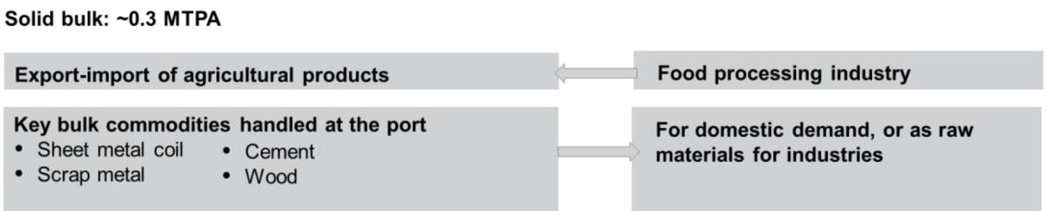
Majority of the port traffic at Tanger Med consists of containers. Industries in and around Tanger Med majorly manufacture discrete goods like automobiles, electronics, machinery, textiles etc. While some of the materials required to support manufacturing are imported like raw materials for textile, others are produced by the supporting industries in the sector parks, like automotive components. Tanger Med handles more than 50% of Morocco's total container traffic.

Exhibit 172: Container movement at Tanger Med



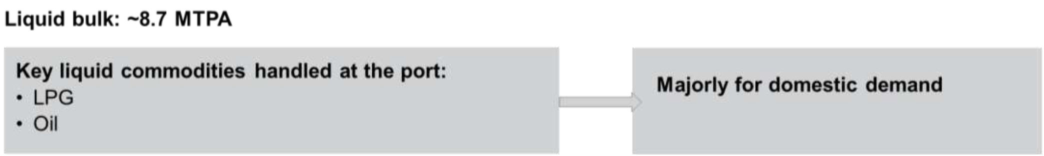
Tanger Med also handles very small quantities of solid bulk. Solid bulk traffic is ~0.3 MTPA. This includes export of agricultural products via food processing industries located in the industrial area. Certain bulk commodities like scrap metal, cement, wood etc. are also imported majorly for domestic demand, or as raw materials for industries.

Exhibit 173: Solid bulk movement at Tanger Med



Majority of the bulk traffic handled at the port comprises of liquid bulk. Tanger Med handled large quantities of LPG and oil imports for domestic demand. ~14% of Morocco's LPG imports are handled there.

Exhibit 174: Liquid bulk movement at Tanger Med



- **Port Infrastructure**
  Tanger Med port is an efficient and truly integrated port complex around the complementary activities of transhipment, import-export, value-added logistics, and maritime and port services. More than a port, it is also an integrated logistics platform, connected to a multimodal transport network (rail links, motorways, and expressways) for the transport of goods and people to all the economic regions of the country. The port offers various and efficient facilities for cargo handling and evacuation.

  Evacuation Infrastructure
  Tanger Med offers efficient evacuation infrastructure via railways, roadways, and truck flows for various commodities like grains, containers, hydrocarbons etc.
  - **Railway terminal**
    Tanger Med has rail linkage to the larger economic zone and national rail network. Rail facilities at the Port include:
    - Container rail terminal – Adjacent to container terminals, the terminal is spread across 10 Ha of land with three 800-m long rail tracks
    - Vehicle railway terminal – The terminal consists of 4 tracks, linking to Automotive City & Renault Tanger Med in the larger economic zone. The trains have a carrying capacity of ~280 rakes/day
    - Others – Marshalling yard, service lines
  - **Truck handling**
    Tanger Med has truck handling stations for general commodities (e.g., container) and specialized truck loading stations (e.g., for hydrocarbon terminal, silo-fed truck loading stations).

Exhibit 175: Evacuation Infrastructure at Tanger Med

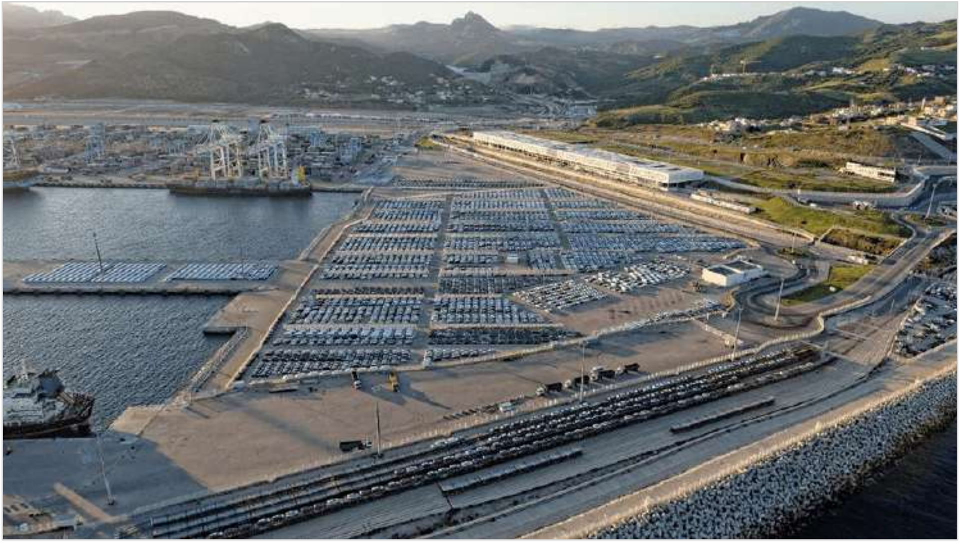
- **Container Handling**
  Tanger Med Port has 4 container terminals, with a total capacity of 9 Mn TEUs p.a. and traffic of ~7.17 Mn TEUs in 2020-21, with the following facilities:
  - **Berths**
    Total quay length of 3,600m & draft of 18m, capable of handling ultra-large container ships (>290m LoA)
  - **Storage**
    - Container yards of 9 Mn TEUs capacity, served by automated gantry cranes
    - Including ~2,000 reefer sockets

- **Container handling equipment**
  - 30+ Ship-to-shore Panamax cranes, with a reach of up to 25 rows / 72m across
  - Mobile harbor cranes to handle oversize cargo
  - ~90 Rubber-tired / Rail mounted gantry cranes (in storage-yard)
  - Trailer trucks, reach stackers and empty handlers for internal transfers of containers

Exhibit 176: Container handling at Tanger Med

- **Car Carrier Terminal**
  Tanger Automotive City hosts 25 automotive factories. Also, Renault Tanger Med is Africa's largest car manufacturing unit, with ~400k p.a. production capacity. The Port has a dedicated Car Carrier Terminal with annual handling capacity of 1 Mn vehicles:
  - **Renault Vehicle Terminal**
    - Storage area of >13 Ha with storage capacity of 6,000 vehicles
    - 2 docks each capable of handling vessels of 240 m LoA and 12 m draft
  - **Multi-use vehicle terminal**
    - Storage area of ~6 Ha with storage capacity of 3,000 vehicles
    - 2 quays each capable of handling vessels of 240 m LoA and 12 m draft
    - Technical/administrative buildings for vehicle export/ trans-shipment services
  - **Vehicle railway terminal,** with 4 tracks each capable of handling a train carrying 280 vehicles

Exhibit 177: Car carrier terminal at Tanger Med



- **Hydrocarbon Terminal**

  Tanger Med Port lies at a strategic location on international shipping routes and handles large bunkering activity. Further, it is a major entry point for LPG imports, which supply domestic demand of LPG.

  Due to this, the Port has a dedicated Hydrocarbon Terminal with annual handling capacity of 15 MTPA and traffic of >6 MTPA in 2019, with the following facilities:

  - **Tank Farm**
    - Storage capacity of ~15 Mn MT / 500k+ cubic meter across 19 tanks, for various products
  - **Vessel-handling infrastructure**
    - 1 berth for vessels of 170 m LoA
    - 6 pipes of 16” – 20” diameter for transfer of cargo to/from vessels
    - 1 berth (at 3 km distance from terminal) for vessels of 250 m LoA
    - 1 truck loading station & 1 rail loading station

Exhibit 178: Hydrocarbon Terminal at Tanger Med

- **Digital Operations**
  Tanger Med Port Authority has partnered with Finnish technology firm, Wartsila, to drive port efficiency through digital solutions, and improve port safety, transparency, and sustainability.
  - **Port Call Optimization**
    Port Management Information System optimizes vessel calls by:
    - Harmonizing procedures for vessel calls through a data platform also featuring other major ports (e.g., Rotterdam, Antwerp, Hamburg, etc.)
    - Installation and coordination of various port information systems – e.g., Advanced Coastal Surveillance Radars, Automatic Identification System, Operator Workstations, etc.
    - JIT arrivals reducing the need for vessels to wait for berthing
  - **Port Community System**
    Multi-service platform capturing data for all procedures in the EXIM process – across maritime movement, import / export transactions, domestic movement, etc. simplifying administration and increasing visibility for all stakeholders.

Exhibit 179: Digital operations at Tanger Med

- **Logistics Free Zone**
  Located in the immediate vicinity of the port, Tanger Med Logistics Free Zone is dedicated to value added logistics and allows faster and efficient distribution of goods. It includes warehouses, offices, and land for processing operations of goods like labelling and assembling.

Exhibit 180: Logistics free zone in Tanger Med

Industries

The industrial land in Tanger Med spans over 5,000 ha, with 2,000 ha currently developed. currently includes 1,100+ companies trading in export-oriented activities creating more than 80,000 jobs focused on industrial and logistics activities in sectors such as aeronautics, automotive, textile, logistics and electronics. It has been master planned as an integrated ecosystem with multiple zones created basis the type of activities in each zone & connectivity to other components.

Exhibit 181: Industrial composition at Tanger Med

Zones	Sectors	Highlights
Tanger Free Zone 440 ha	Automotive, aeronautics, textile	• One of the most important centers of activities with leading companies from automotive, textile & aeronautics
Tangier Automotive City 600 ha	Automotive components	• Proximity to largest car manufacturing site in Africa Well developed logistics system with connectivity to railways & truck terminal
Renault Tanger Med 350 ha	Largest car plant in Africa	• Near to Renault vehicle terminal in the port complex (part of the overall vehicle terminal)
Tetouan Park 160 ha	Light Industrial Units	• Adjacent to expressway linking Tangier & Tetouan • Built for industrial units targeting regional markets of Northern Morocco
Tetouan Shore 20 ha	Services, Offshoring	• The zone offers office spaces for activities such as ITO, BPO and KPO
Logistics Free Zone 300 ha	Logistics	• Located in the immediate vicinity of the port, the zone is for dedicated value-added logistics activities, allowing fast and easy distribution
Commercial Zone 70 ha	Services & Retail	• Built to provide commercial appeal to the region • Includes retail stores, restaurants, and outlets

Incentives

Tanger Med offers high support across a lot of categories to attract investments. Some of these incentives are listed below:

Exhibit 182: Incentives offered in Tanger Med

Incentives	Key Strategic Questions
Tax-related benefits	• Competitive tax advantages (0% tax during the first 5 years and 8.75% the following 20 years) • Exemption of VAT, and other local taxes like business tax and urban tax
Custom related benefits	• Exemption of custom duty • Exemption from regulations related to the control of foreign trade and exchange
Utility related benefits	• Presence of Tanger Med utilities to offer support in water & electricity distribution services

	Incentives	Key Strategic Questions
	Regulatory & operational benefits	• All Tanger Med sectoral activity zones have a point of single contact to assist investors in all their procedures (authorizations, building permits, facility management, etc.) to enable timesaving and focus on their activity • State subsidies and training support and financial grants for the projects
	Land related benefits	• Exemption from registration costs on the purchase of land

11.13.3. Map Ta Phut, Thailand

Evolution

Map Ta Phut Industrial Estate was established as a greenfield petrochemical complex by Industrial Estate Authority of Thailand in 1990. It was being developed as a part of Eastern Seaboard Development Program. The vision was to develop Map Ta Phut as the international modern industrial area with a large base of chemical and petrochemical industries in the country. The development witnessed the involvement of Japan International Cooperation Agency as a planner, advisor and financier.

Post the establishment of the National Petrochemical Complex-1, there was a need of an industrial port to enable easy transportation of raw materials required. Hence, Map Ta Phut Industrial port was constructed with 2 public terminals- for general cargo and liquid cargo. It initiated operations in 1993.

The next two decades witnessed expansion of Map Ta Phut into a full-fledged petrochemical and chemical hub supported by a large bulk port. The industrial complex grew from an area of 516 ha to over 1,600 ha, consisting of an oil refinery, fertilizer and steel industries, chemical industries, and a new petrochemical complex (NPC-2). To cater to power demand in the estate and the country, coal fired, and gas fired power plants were established, with a combined capacity of ~3,380 MW. Map Ta Phut also increased its capacity and became one of the most important ports in the country after the Bangkok port. It now houses 3 public terminals for bulk and liquid cargo, and 9 dedicated terminals to support industries and power plants in the complex. Expansion of port (phase 3) is underway, with a new LNG and liquid terminal with infrastructure like warehouses etc. being developed.

Exhibit 183: Evolution of Map Ta Phut Port

1990	1993	2017
Map Ta Phut established as a greenfield petrochemical complex by IEAT[3] →	**Expanded into a full-fledged petrochemical and chemical hub, supported by a large bulk port** →	**Transformed into Thailand's largest Industrial estate and a petrochemical and chemical hub covering entire Rayong province**
Map Ta Phut Industrial Complex **Map Ta Phut Port: Phase 1** **Public Terminals** **Industrial Area: 516 ha** **Port Traffic: ~0.2 MTPA**	**Map Ta Phut Industrial Complex** **Industrial Area: 1,600 ha** **Port Phase 2:** **3 public terminals for bulk and liquid cargo** **9 dedicated terminals for industries** **Port Traffic: 41.7 MTPA** **Map Ta Phut Power Generation** **Capacity: ~3.3 GW**	**Industrial developments in Map Ta Phut expanded to entire Rayong province:** **1. Expansion to an overall industrial footprint of 3,000 ha** **2. A home to the largest petrochemical developments in Thailand with ~1,700 factories in the entire province** **3. Contributes nearly 14% of Thailand's GDP**

Today, Map Ta Phut is Thailand's largest industrial estate and a petrochemical and chemicals hub covering entire Rayong province. The industrial developments in Map Ta Phut expanded to entire province.

With ~1,700 factories, and investments of over USD 27,000 Mn, the province now contributes nearly ~14% to Thailand's GDP.

Exhibit 184: Map Ta Phut Port & Industrial Estate

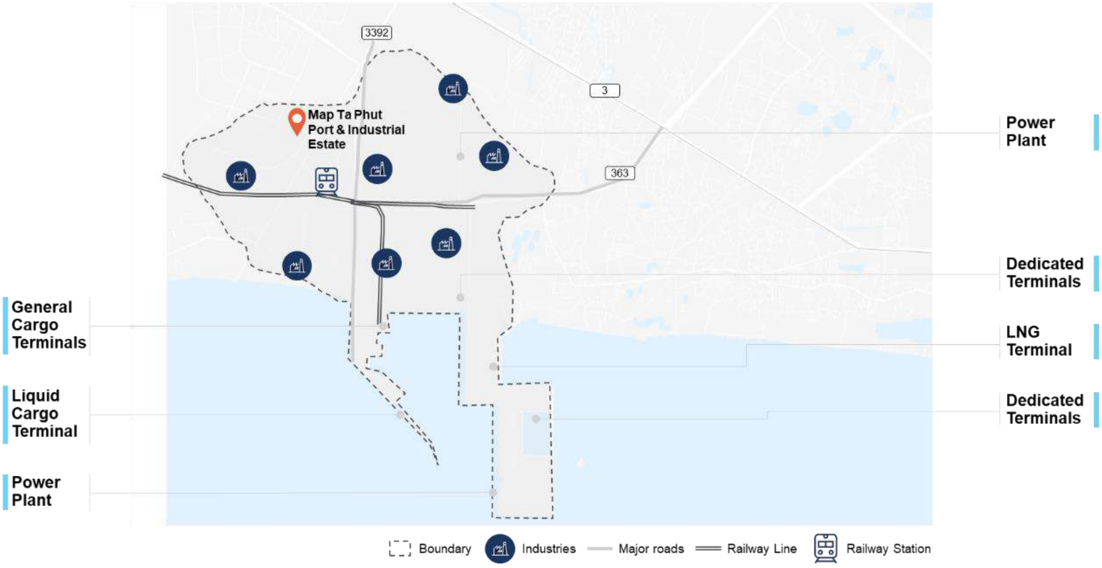


Exhibit 185: Current composition of Map Ta Phut

Component	Key Information
Port Traffic	~41.7 MTPA
LNG Terminal	11.5 MTPA (Thailand's first LNG Terminal)
Power Plant	~3.3 GW[195] (~6.5% of Thailand's overall capacity)
Industrial Area	~1,600 ha (largest industrial estate in Thailand)

Governance

Map Ta Phut is currently being developed by the Industrial Estate Authority of Thailand ("IEAT"), which is state enterprise under Ministry of Industries as below:

- To develop and establish industrial estates to distribute industrial development across the country
- Providing public utilities, essential facilities and undertaking investment promotion
- Approving and authorizing operations and concessioning in the industrial estates
- Providing relevant additional incentives, privileges, and facilitation for industrial estates

Different components of the estate are headed by different offices. Map Ta Phut Industrial Estate office oversees management and operations of industries. The area is leased out to various players for factories, power generation etc. For example, IEAT signed a rental contract with an IPP elected by Electricity Generating Authority of Thailand to provide electricity via PPA for 25 years. While Map Ta Phut Industrial Port office oversees operations and development of the port. Multiple concessions are given to different operators to oversee port operations.

These offices along with departments and other functions like administration, strategy, operations, environment, HR etc. are headed by Deputy Governors of each estate.

[195] Including Tata's power plant in the vicinity

Exhibit 186: Governance structure at Map Ta Phut

Industrial Estate Authority of Thailand

State enterprise under Ministry of Industry responsible:

- To develop and establish industrial estates in order to distribute industrial development across the country
- Providing public utilities, essential facilities and undertaking investment promotion
- Approving and authorizing operations and concessioning in the industrial estates
- Providing relevant additional incentives, privileges, and facilitation for industrial estates

Deputy Governors

To govern multiple industrial estates along with various departments & functions like administration, strategy, operations, environment, HR etc.

Industrial Port

Map Ta Phut Industrial Port Office

The office handles management of the port while multiple concessions are given for different components of the port.

SCG Chemicals, SPRC, NFC, Glow, BLCP Power, Thai Tank Terminal

Industrial Estate

Map Ta Phut Industrial Estate Office

The office oversees operations, development of infrastructure of the estate before the area is leased out to various players for factories, power generation etc.

Port

- **Operations**
  With a deep-water depth of 9-17 m CDL and a port traffic of ~41.7 MTPA including both liquid and bulk cargo, Map Ta Phut port supports the biggest chemical and petrochemical hub in the country. The port comprises of public terminals for general customers and dedicated terminals for specific companies and operators. The public terminals are operated by the Industrial Estate authority of Thailand wholly, or in PPP with private companies.

  There is a total of 33 berths, dedicated for general bulk, liquid, and other specific commodities.

Exhibit 187: Port operations at Map Ta Phut

Operator	Berths	Terminal
Public Terminals		
	4 Berths	Map Ta Phut Industrial Terminal (IEAT)
TCT	2 Berths	Thai Connectivity Terminal (PPP)
Thai Tank Terminal	4 Berths	Thai Tank Terminal (PPP)
Dedicated Terminals		
NFC	1 Berth	Fertilizer products & chemicals

Operator	Berths	Terminal
SPRC	7 Berths	Oil, LPG, Fuel
ptt GLOBAL CHEMICAL	3 Berths	Oil & Fuel
SCGC	4 Berths	Petrochemicals
GLOW	1 Berth	Coal
BLCP POWER	1 Berth	Coal
ptt LNG	3 Berths	LNG
ptt TANK	2 Berths	Chemical products
SCG CHEMICALS	1 Berth	Petrochemicals

Exhibit 188: Terminals at Map Ta Phut

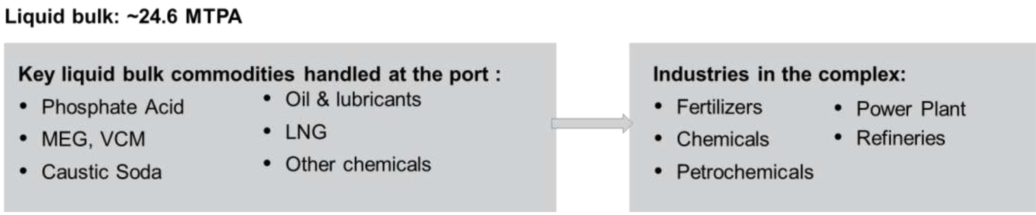
- **Port Traffic**

  Map Ta Phut port handles large amount of bulk traffic. The port was established to support the industries located in the industrial estates around the port. Map Ta Phut Industrial Estate along with other estates in the province, houses large scale bulk industries, making the area country's biggest chemical and petrochemical hub.

  >50% of the traffic in Map Ta Phut is comprised of liquid bulk. Industries like

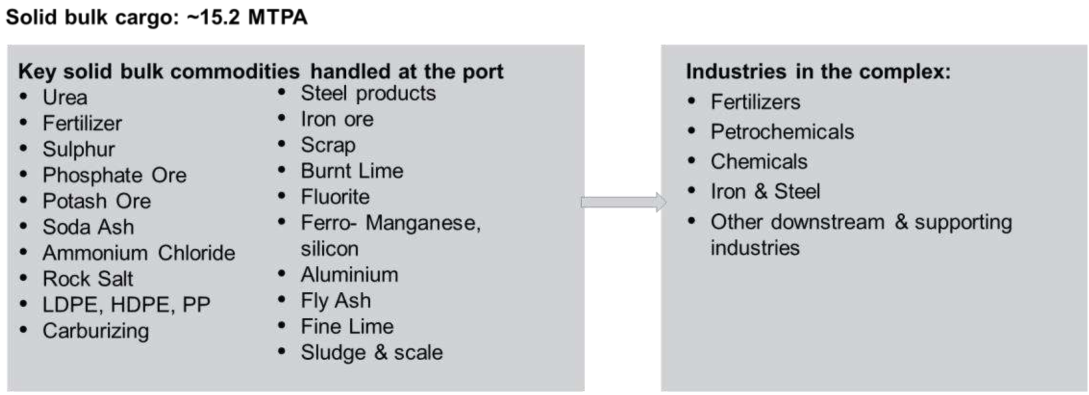
refineries, chemicals, and petrochemicals etc. in and around the port majorly import raw materials like coal, caustic soda, LNG, oil etc. to support manufacturing.

Exhibit 189: Liquid bulk handling at Map Ta Phut



Solid bulk is also a major component handled at the port. Industries like fertilizers, iron & steel require bulk materials like rock salt, sulphur, steel cargo, iron ore, scrap etc. These are imported at the port to support the adjoining industries.

Exhibit 190: Solid bulk handling at Map Ta Phut



- **Port Infrastructure**

With deep draft berths & dedicated infrastructure for specific commodities, the port houses facilities for efficient cargo handling at all stages from seaside to evacuation.

○ **Hinterland Connectivity**

Map Ta Phut offers rail and road linkage to the Map Ta Phut industrial area, national rail and highways and other important nodes along the Eastern Economic Corridor. Planning to upgrade the railway line from a single track to a standard gauge double track is underway.

○ **LNG Terminal**

Map Ta Phut has a private LNG terminal with a capacity of 11.5 MTPA.

- Seaside Infrastructure
  - 3 jetties capable of handling 2,64,000 DWT LNG vessels
  - Jetty to land LNG pipelines
- Landside Infrastructure
  - 4 LNG storage tanks of 1,60,000m3
  - Regasification unit of ~1,610 MMSCFD1
  - Truck loading station of 50 MT / day capacity
  - Others – Boil-off gas recondenser, send-out station, LNG pump

Exhibit 191: LNG handling infrastructure at Map Ta Phut

Industries

Spread over ~1,600 ha, Map Ta Phut Industrial Estate is the largest industrial estate in Thailand. The estate is also the biggest chemical and petrochemical hub in the country. Map Ta Phut houses bulk industries like fertilizers, chemicals, petrochemicals, iron & steel, and other downstream and supporting industries. The estate also has oil refineries and gas and coal-based power plants, contributing ~6.5% to Thailand's overall capacity. The industrial area serves majority of the domestic demand for petrochemicals and chemicals.

Incentives

Map Ta Phut offers high support across a lot of categories to attract investments. Some of these incentives are listed below:

Exhibit 192: Incentives offered in Map Ta Phut

Incentives	Key Strategic Questions
Tax-related benefits	• Exemption of corporate income tax for three / five / eight years basis the type of activity
Custom related benefits	• Exemption of import duties on machinery. • Exemption of import duties on raw materials used in R&D • Exemption of import duties on raw materials used in production for export
Regulatory & operational benefits	• Visa related help and support in permits • Permit to take out/ transfer/ remit in foreign currency • Permit for skilled worker and expert to work on the project's promoted activities
Land related benefits	• Permit to own land for the purpose of Board of Investment promoted activities

11.13.4. Bintulu, Malaysia

Evolution

Discovery of natural gas reserves in Bintulu and expansion in LNG manufacturing and industrial developments led to a need for planned development in the region. Hence, Bintulu Development Authority was established in 1970s, to implement and coordinate developments, while facilitating land allocation and creation of master plans. The vision was to create Bintulu a friendly industrial estate by 2025.

During the first two decades, Bintulu experience energy intensive industrial development, with growth in LNG plants, edible oil refineries, cement and fertilizer plants, gas-to-liquid plant. These were supported by establishment of Bintulu port. The port handled both bulk and container traffic. The period also witnessed establishment of light industrial estates for wood-based, and other light industries.

During 2000s, the industrial expansion in Bintulu continued, making it the largest LNG manufacturing complex in one place with a capacity of ~23.5 MTPA. Two combined cycle power plants generating ~1,110 MW also became operational. Bintulu port also opened a new edible oil terminal to handle edible oil exports from the refineries. This growth across components, was supported by infrastructural developments like establishment of Bintulu airport.

In 2008, Sarawak Corridor for Renewable Energy was launched, with Bintulu being a core development area. Samalaju Industrial Park was established as a greenfield project in Bintulu. The industrial area at Samalaju Park is spread over 7,000 ha, housing heavy industries like aluminium, petrochemical, refineries etc. An industrial port was also established to provide bulk and break-bulk cargo services for heavy industries located in the industrial park.

Today, spread over 320 ha, Bintulu port handles ~48 MTPA of cargo traffic, and is the largest exporter of LNG and palm oil in Malaysia (handling ~90% of State's palm oil exports). The industrial developments are growing with a plan to develop Bintulu into a downstream petrochemical hub.

Exhibit 193: Evolution of Bintulu

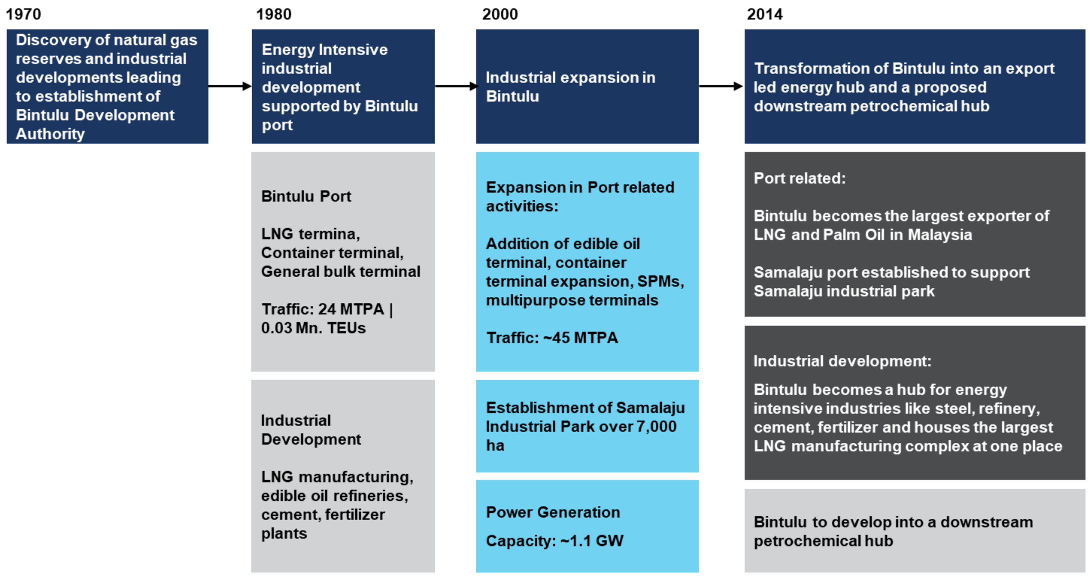


Exhibit 194: Bintulu Port & Industrial Area

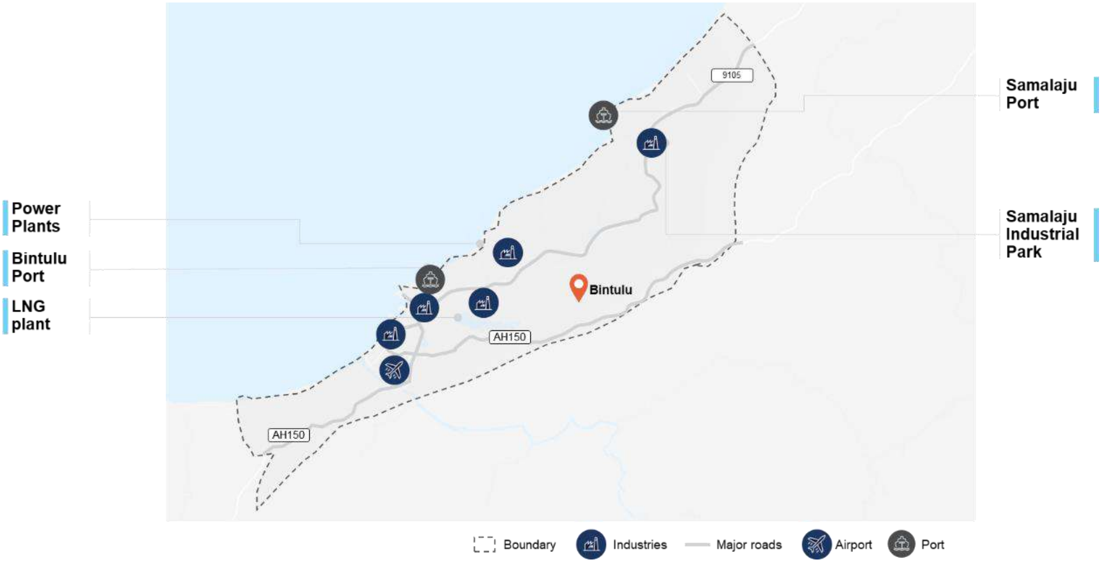


Exhibit 195: Current composition of Bintulu

Component	Key Information
Port Area	
- Bintulu Port	320 ha
- Samalaju Port	393 ha
Port Traffic	~48 MTPA (surpassed 1 Bn. Tons of cargo since 1983)
LNG Manufacturing	27 MTPA
Industrial Area	~9,000 ha
- Bintulu	~2,000 ha
- Samalaju	~7,000 ha

Governance

Bintulu is governed by Bintulu development authority, which is the local council to undertake development of the city. The authority integrates and coordinates development across components and different agencies, by providing a common vision, creating master plans, undertaking land allocation according to the land use and coordinating development initiatives.

The industrial estates in Bintulu like Samalaju Industrial Park etc. are governed by the Bintulu Development Authority.

Bintulu Port Holdings Berhad, a public company, has three subsidiaries namely, Bintulu Port Sdn. Bhd., Samalaju Port Sdn. Bhd., BiPort Bulkers Sdn. Bhd.

- Bintulu Port Sdn. Bhd has been licensed by Bintulu Port Authority to operate the port on a concession basis
- Samalaju Industrial Port Sdn. Bhd. operates Samalaju port with Samalaju Port Authority (government agency)
- BiPort Bulkers Sdn Bhd owns and operates vegetable oil bunkering at Bintulu port

Sarawak Power Generation Sdn. Bhd. which is a wholly government owned agency owns and operates power plants in Bintulu.

However, these multiple agencies are integrated towards a common vision by Bintulu Development Authority.

Exhibit 196: Governance structure at Bintulu

Bintulu Development Authority

Local council to undertake development of the city, formed in 1978 after discovery of gas reserves, responsible for coordinating development initiatives, developing infrastructure and master plans and land allocation to various industries according to the land use plan for ~12000 sq km.

1. **Bintulu Development Authority** — **Samalaju Industrial Park**
2. **Bintulu Port Holdings Berhad - BPHB** (Public company with ~39% share of Sarawak state govt. + ~37% stake of federal agency Petronas & govt. Pension Fund authority together + rest owned by public)
   - a. **Bintulu Port Sdn Bhd**
   - b. **Samalaju Industrial Port Sdn Bhd**
   - c. **BiPort Bulkers Sdn Bhd**
3. **Sarawak Power Generation Sdn Bhd** (Wholly-owned by the government) — **Bintulu Combined Cycle Power Plants**
4. **Petronas** (Wholly-owned & operated by the government with majority stakes in all LNG plants) — **LNG Terminal**

Port

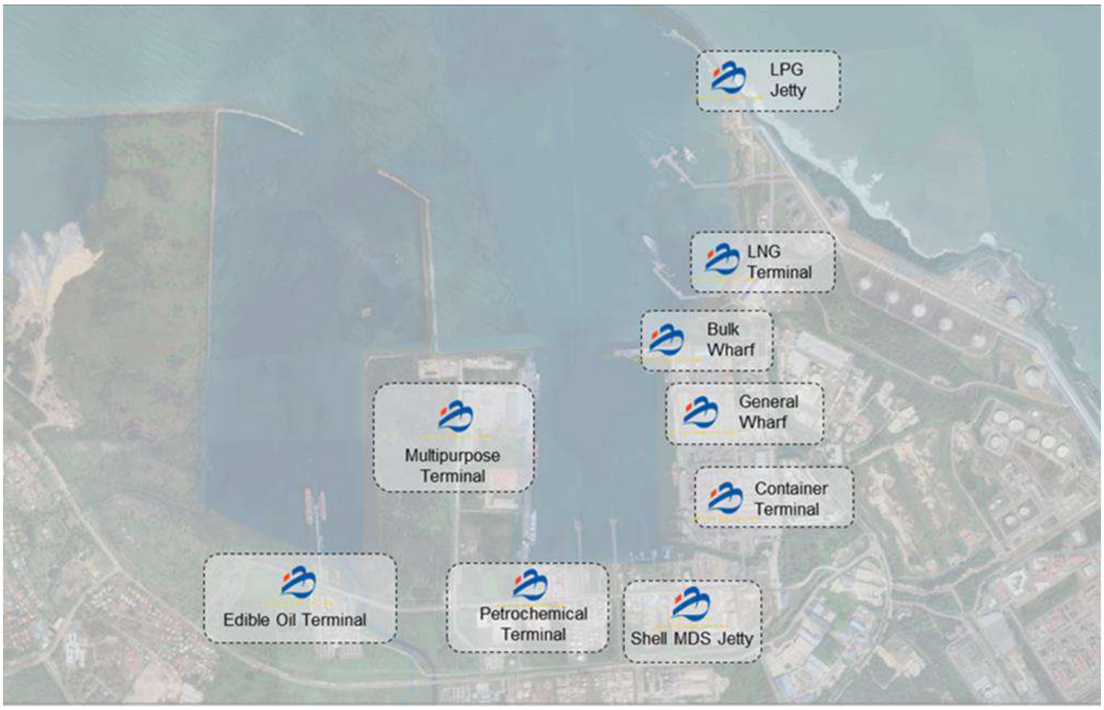
- **Operations**
  With a water depth of 10.5-14 m, and a traffic of ~48 MTPA, Bintulu port has multiple terminals for LNG, containers, bulk cargo, and edible oil. Bintulu port was operated by Bintulu Port Authority (government agency), which was later privatized and Bintulu Port Sdn. Bhd. was licensed by Bintulu Port Authority to develop and operate Bintulu Port on a concession basis. All the terminals at Bintulu port are operated by different subsidiaries of Bintulu port Sdn. Bhd., who is the sole operator of the port.

Exhibit 197: Operations at Bintulu Port

Operator	Berths	Terminal
Bintulu Port Sdn. Bhd.	3 Berths	General Cargo
Bintulu Port Sdn. Bhd.	1 Berth	Bulk Cargo
Bintulu Port Sdn. Bhd.	3 Berths	LNG Jetty
Bintulu Port Sdn. Bhd.	1 Berth	LPG Jetty
Bintulu Port Sdn. Bhd.	2 Berths	Petrochemical Terminal

Operator	Berths	Terminal
	1 Berth	Shell MDS Jetty
	2 Berths	Container Terminal
	2 Berths	Edible Oils Terminal
	5 Berths	Multipurpose Terminal

Exhibit 198: Terminals at Bintulu port

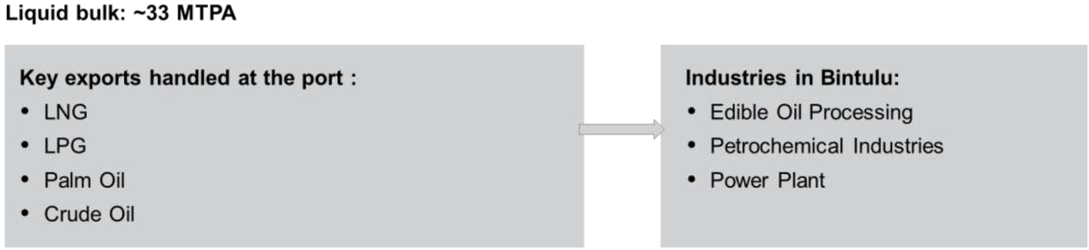


- **Port Traffic**

  Being one of the most important ports in Malaysia, Bintulu port is a deep seaport handling Malaysia's major exports like LNG, Palm oil etc. The port is gateway to the dynamic industrial developments in Bintulu focused on energy intensive heavy industries.

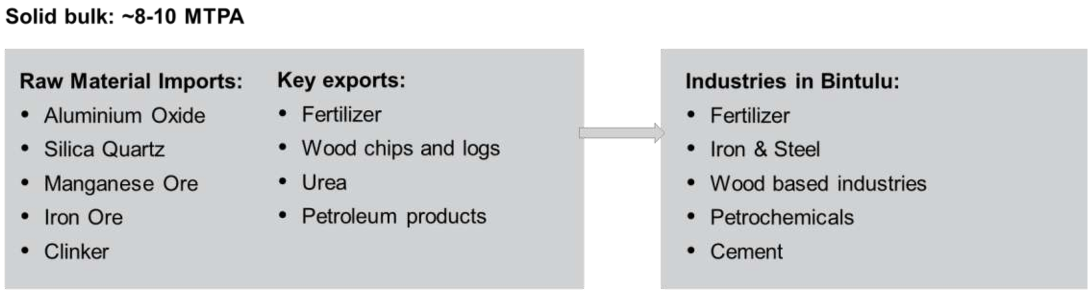
  Majority of the traffic catered at the port is liquid bulk, comprising of ~60-70%. The port majorly handles exports of products from industries like LNG, LPG, palm oil and crude oil amongst others. Bintulu handles largest LNG and palm oil exports in Malaysia.

Exhibit 199: Liquid bulk handling at Bintulu Port



Solid bulk comprises of ~8-10 MTPA traffic. These constitute of raw material imports like aluminium oxide, silica quartz, manganese ore and iron ore. Moreover, goods produced in industries like fertilizer, wood chips and logs, urea, petroleum products are also exported.

Exhibit 200: Solid bulk handling at Bintulu Port



Container traffic at Bintulu port is ~0.3-0.4 Mn. TEUs. The port houses 2 container terminals with a capacity of ~0.4 Mn. TEUs. Of the total containers handled, ~20% of the traffic is for transshipment.

- **Port Infrastructure**
  With dedicated terminals for specific commodities, the port houses facilities for efficient cargo handling at all stages from seaside to evacuation.

- **Cargo and Container handling**
  - **Berths**
    Total berthing length of ~3,800 m & a maximum draft of 14 m, capable of handling maximum vessel size of 80,000 DWT
  - **Storage**
    - Container yards, bulk fertilizer yards, warehouses, open storage areas and transit sheds
    - Including ~84 reefer points, ~3,800 ground slots
  - **Equipment**
    - Container quay cranes and mobile harbour cranes for Panamax and Post-Panamax vessels
    - 14 Rubber-tired gantry cranes
    - ~40 Terminal tractor, ~50 container trailer, Forklifts, empty container handler, reach stacker diesel

Exhibit 201: Container handling at Bintulu Port

- **LNG terminal**
  Handling large amount of LNG exports (~25 MTPA), the LNG terminal at Bintulu port is the first one in the ASEAN region to be established as a LNG ISO tank export hub with ISO tank filling facility operations.

Exhibit 202: LNG handling at Bintulu Port

- **Edible Oil terminal**
  Bintulu port handles ~91% of the State's palm oil exports. To support this, Bintulu Port houses 2 edible oil terminals. With a total of 3 berths, supported by 13 units of 10" pipelines, the port can accommodate a maximum of two vessels up to 50,000 DWT at one time. The terminals are also equipped with utilities like firefighting facilities, water supply etc.

Exhibit 203: Edible oil handling at Bintulu Port

Industries

Industrial area in Bintulu spans over ~9,000 ha, with industries including both bulk and discrete industries like cement, fertilizers, edible oil processing, petrochemicals, wood-based industries, steel and aluminium, glass manufacturing and shipbuilding amongst others. Bintulu also houses the world's largest LNG manufacturing complex at one place. The ASEAN Bintulu fertilizer plant is one of the largest granular urea plants in Asia.

The industrial estates have been master planned and developed by the Bintulu Development Authority. The industrial expansion in Bintulu is also supported by the vision created by the local council, "to make Bintulu a friendly industrial estate by 2025". While Bintulu is considered an energy intensive industrial hub, the government is planning to develop Bintulu into a downstream petrochemical hub to utilize state's LNG reserves.

Incentives

Bintulu offers high support across a lot of categories to attract investments in its industrial estates. Some of these incentives are listed below:

Exhibit 204: Incentives offered in Bintulu

Incentives	Key Strategic Questions
Tax-related benefits	• 70% tax exemption on statutory income for 5 years • Reinvestment and investment tax allowances of 60% on qualified capital expenditure
Custom related benefits	• Import duty exemptions • Manufacturing projects catering for domestic market are entitled to full import duty exemption on any raw material, components or parts which are not available in Sarawak. • Eligibility for double deduction on freight charges incurred in the export of rattan and wood-based products (except plywood, sawn timber, and veneer)
Utility related benefits	• Reduced electricity tariffs and water rates
Land related benefits	• Competitive land prices and varying lease periods • Flexible terms of payment for industrial land and rebates if the project is completed within specified time

11.14. Manufacturing and trade in Bangladesh

All values are in USD Bn

Industries	Total domestic demand	Total national output	Imports	Imports Raw Material	Imports Finished Products	Exports
Leather and leather goods	2.0	3.0	0	0	0	1.0
Pharma drug formulation	2.8	2.6	0.3	0.0	0.3	0.1
Fertilizer	1.4	0.4	1.0	0.0	1.0	0
Rubber	0.5	0.2	0.3	0.0	0.3	0.0
Plastics	2.9	2.5	2.2	1.7	0.5	0.1
Cement	3.1	3.1	1.0	1.0	0.0	0.0
Paper and paper products	0.7	0.6	0.8	0.6	0.1	0.1
Refined petroleum products	4.7	0.2	5.2	0.6	4.6	0.1
Chemical and chemical products	3.4	0.8	2.6			0.0
RMG	25.5	47.8	0.6	0.0	0.6	22.9
Textile (pre RMG)	22.5	12.4	10.9	6.6	4.4	0.9
Steel and steel products	4.5	2.3	3.6	1.4	2.3	0.1
Agro and food processing (inc. beverage and tobacco)	24.3	16.4	8.9	NA	NA	1.0
Machinery and equipment (inc. electronics)	10.8	3.0	8.4	NA	NA	0.597
Glass	0.2	0.1	0.1	NA	NA	0.0
Automobile and auto components	1.2	0.1	1.1	0.0	1.1	0.0
Furniture	1.2	1.0	0.2	NA	NA	0.1
Total		**96.7**	**47.2**			**27.0**

11.14.1. Industrial areas in Bangladesh

A. Dhaka division – Industries

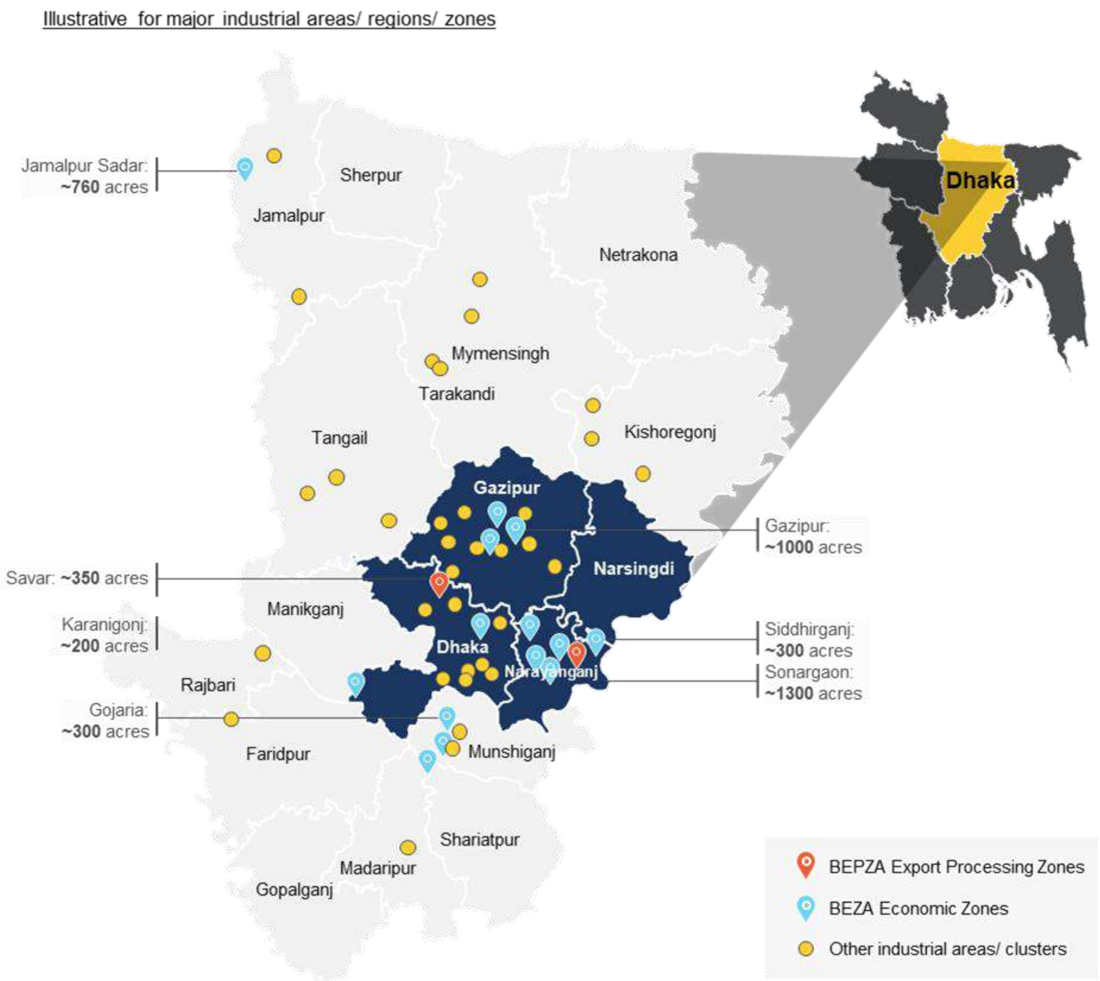
Dhaka is the first economic hub in the country and is the economic center for Bangladesh. It is the largest urban center in the country. Post the development of industries in Dhaka, a lot of industrial areas also diversified outside the region.

Being the largest construction center, most of the construction intensive industries are located in Dhaka such as cement, steel. Further, availability of labor pool has led to creation of a strong ecosystem of RMG, pharma and FMCG industries.

Major industries

- Dhaka – Apparel, textiles, cement, fertilizers, consumer durables, electronics, plastic, pharmaceuticals, leather etc.
- Narayanganj – Pharmaceuticals, steel
- Gazipur – Pharmaceuticals, steel, footwears

Exhibit 205: Industrial areas in Dhaka division



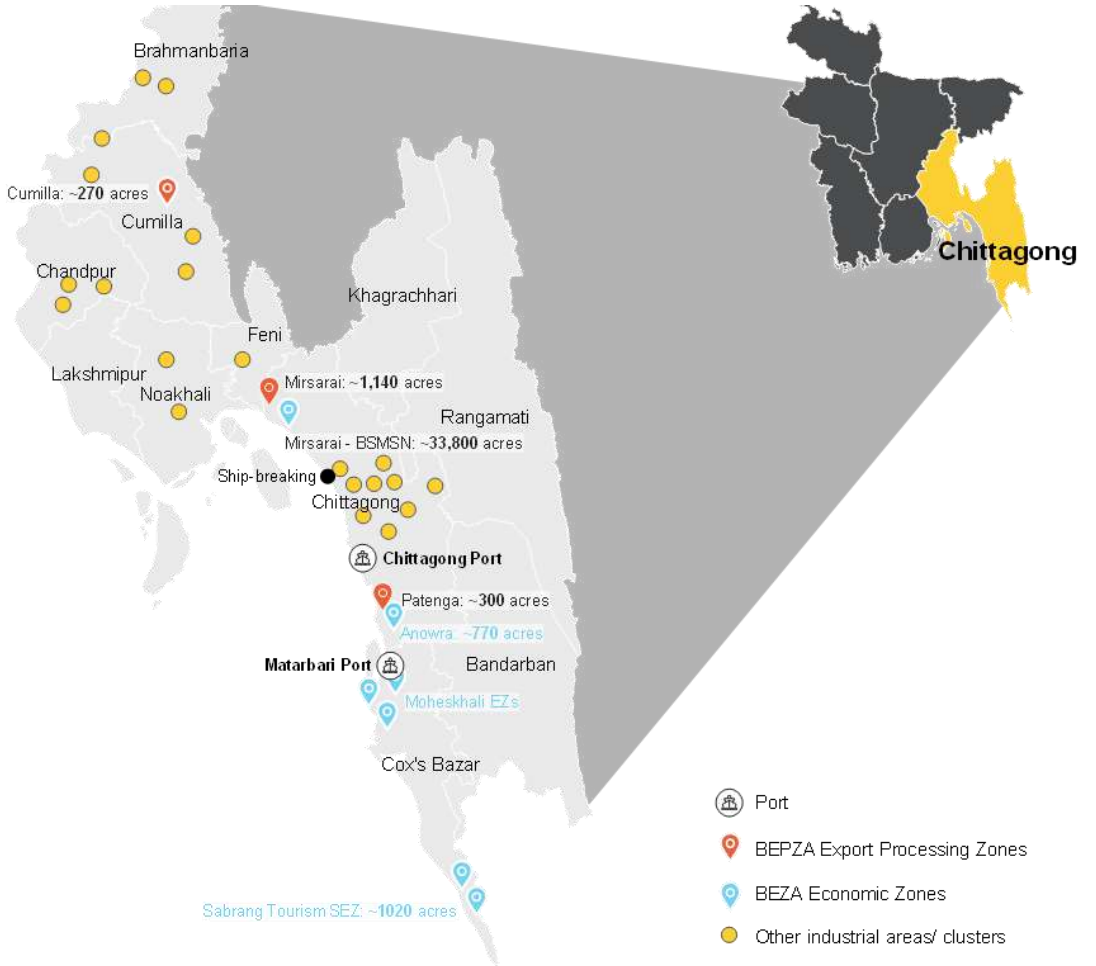
B. Chittagong division – Industries

Chittagong division is the industrial region with largest port in the country. The region also has high consumption as it is the second largest urban center in the country after Dhaka. The industrial city has significant presence of players in steel and cement sectors. The division also houses the only refinery in the country – Eastern Refinery Limited (ERL).

Major industries

- Steel, fertilizers, cement, apparels, textiles, ship-breaking, refinery, paper and paper products

Exhibit 206: Industrial areas in Chittagong division



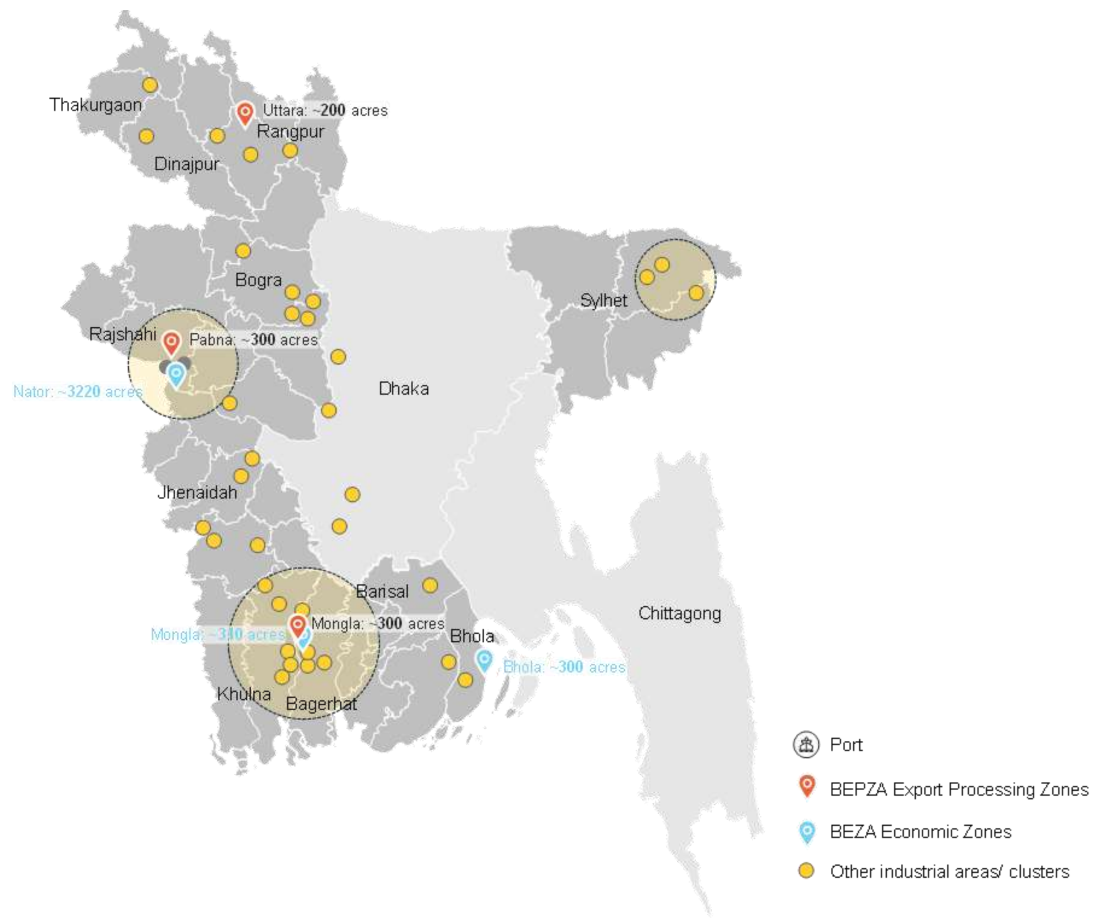
C. Other regions – Industries

Other major industrial regions in the country are located mainly in Khulna, Rajshahi and Sylhet divisions. Khulna (Mongla) is a port based industrial area with small bulk terminal. Rajshahi connected via land with India is the land-based import hub of Bangladesh. With its agriculture driven economy Sylhet is the hub for tea production.

Major industries

- Khulna – Textiles, jute, cement, chemicals, food processing, food packaging, shipbuilding etc.
- Rajshahi - Agri and food processing, plastics packaging, textiles (mainly silk)
- Sylhet – Food processing and tea industry (mainly

Exhibit 207: Industrial areas in other regions in Bangladesh



D. BSMSN – Bangabandhu Sheikh Mujib Shilpa Nagar

Planned across 2 districts of Chattogram and Feni – BSMSN is the flagship smart city / economic hub development of GoBD. The planned development of BSMSN is spread across ~33,800 acres, with ~50% of area dedicated to industries and logistics hub. The main focus in BSMSN is on medium-heavy manufacturing industries.

As of date, there are 4 operational units in the region (inaugurated in Nov'22) including a steel re-rolling mill, construction pile manufacturing plant, chemical manufacturing plant and paint manufacturing plant. Further, committed investments in BSMSN include – Bashundhara Industrial Park (~500 acres), BGMEA Garments Park (~500 acres) and BEPZA Economic Zone (~1,150 acres).

As per BEZA, once completely developed - BSMSN will contribute to ~USD 15 Bn of exports and expected to create employment opportunity for ~1.5 Mn people.

Some of the potential sectors identified for BSMSN include garments & garment supporting industries, agro-products and agro-processing products, integrated textiles, leather and leather products, ship building, motorbike assembly. food & beverage, paint & chemical, paper & products, plastics, light engineering (including auto-parts and bicycles), pharmaceutical products, power and solar park.

Exhibit 208: Bangabandhu Sheikh Mujib Shilpa Nagar - location map

11.15. Industry selection

11.15.1. Domestic / value-added manufacturing

Step 1 – Preparation of long-list of sectors

At the initial step, a long list of sectors was prepared basis:

- Focus sectors as per Bangladesh Industrial Policy
- Existing sectors in BEZA / BEPZA industrial areas
- Export-focused manufacturing in similar global hubs

Long-list of sectors include leather and leather goods, pharma drug formulation, fertilizers, rubber, plastics, cement, paper and paper products, petroleum and petrochemicals, chemical and chemical products, readymade garments (RMG), textile (pre RMG), steel, agro and food processing, machinery and equipment, glass, automobile and auto components and furniture.

Step 2 – Shortlisting metrics

At step 2, a framework for shortlisting sectors was prepared by assigning weightages to select parameters - identified basis discussions with sector experts. Long list of sectors was scored against each of these metrics to arrive at the selected shortlist of sectors identified for MIDI.

The shortlisting metrics and corresponding weightages to each are tabulated below.

Exhibit 209: Sector selection framework for manufacturing at MIDI in short-term

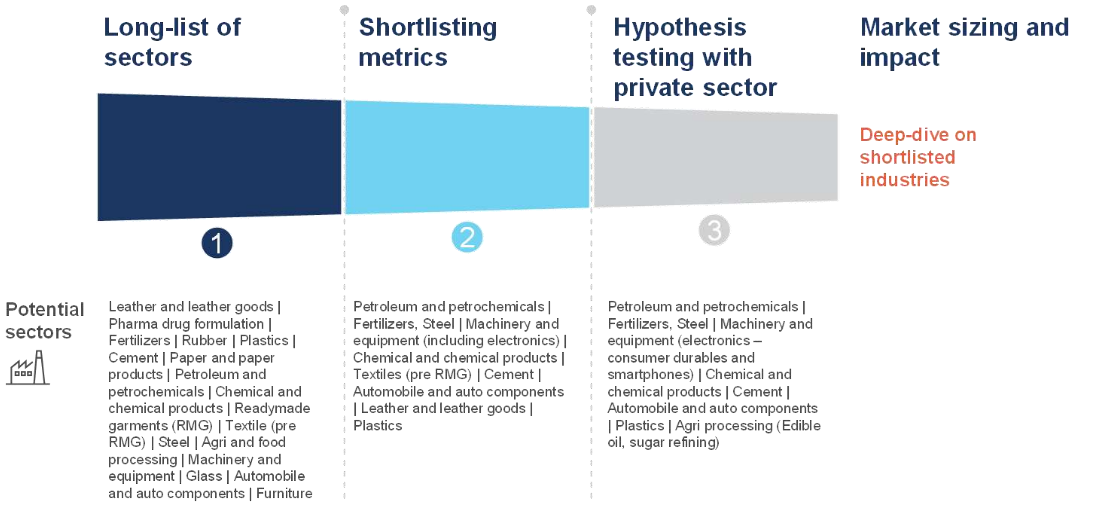


Exhibit 210: Metrices for shortlisting of industrial sector for MIDI

Category	Parameter	Weightage
Market and Opportunity Size	Current industry size and growth	10%
	Future growth potential	10%
	EXIM dependencies (Opportunity size)	10%
MIDI Endowments & Objectives	Proximity to deep seaport	15%
	Energy intensive	10%
	Logistics intensive	10%
	Large land requirement	15%
	Employment potential	10%
Others	Policy support by government	5%
	Environment sensitivity	5%

Exhibit 211: Framework for shortlisting of industrial sectors for MIDI

ILLUSTRATIVE

High | Medium | Low

Industries	Parameters towards MIDI's endowments: Current BD industry size and growth trend	Future growth potential	Opportunity size (export size or import size)	Proximity to Deep Sea Port	Labor intensive	Energy intensive	Logistics Intensive	Land requirement	Policy support by GoBD	Environmental sensitivity	Score	Sector Bucket
Petroleum and petrochemicals	High	High	High	High	Medium	High	High	High	Medium	Low	0.9	Import substitution
Steel and steel products	Medium	Medium	Medium	High	High	High	High	High	Medium	Low	0.8	Local value addition
Fertilizer	High	Medium	High	High	Medium	Medium	High	High	Low	Medium	0.8	Import subsitution
Chemical and chemical products	High	Medium	High	High	High	Low	Low	High	High	Low	0.8	Import substitution
Machinery and equipment (inc electronics)	High	Medium	Medium	High	High	Medium	High	Medium	Low	Low	0.7	Import substitution + Exports
Agri and food processing	High	Medium	High	Medium	High	Medium	Medium	Medium	Medium	Low	0.7	Import substitution
Plastics	High	Medium	Medium	Medium	Low	Medium	High	High	Medium	Low	0.6	Import substitution
Automobile and auto components	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium	High	Low	0.6	Import substitution + Exports
Cement	Medium	High	Medium	Medium	High	Medium	Low	Medium	High	Medium	0.6	Local value addition
Leather and leather goods	Medium	High	Medium	Medium	Low	Medium	Medium	Low	High	Medium	0.5	
Textile (pre RMG)	High	Low	High	Low	High	Medium	Low	Low	High	Medium	0.5	
Pharma drug formulation	Medium	High	Low	Medium	High	Low	Low	Low	High	Medium	0.5	
Furniture	High	Low	High	Low	Medium	Low	Low	Low	High	Medium	0.5	
RMG	Medium	High	Low	Low	High	Low	Low	Low	Medium	Medium	0.4	
Paper and paper products	Low	Low	Low	Low	High	High	Low	Low	Medium	Medium	0.3	
Rubber	Low	Low	Low	Low	High	Medium	Low	Low	Medium	Low	0.3	
Glass	Low	Low	Low	Low	High	Medium	Low	Low	Low	Medium	0.2	

Shortlisted industries at step 2 include petroleum and petrochemicals, steel, fertilizers, chemicals, machinery and equipment, agro and food processing, plastics, automobile and auto components and cement, leather and leather products and textiles.

Step 3 – Hypothesis testing with private sector and sector deep dives

Further, a final list was arrived by testing of initial hypothesis of shortlisted sectors with major private sector and experts.

Final list of shortlisted industries for further study:

- Petroleum and petrochemicals
- Plastics
- Steel
- Cement
- Agro and food processing – edible oil, sugar refining, salt refining
- Fertilizers
- Chemicals
- Automobile and auto components
- Machinery and equipment (electronics, consumer durables and smartphones)

For the above shortlisted 9 sectors, an in-depth industry assessment was undertaken to identify the target capacity and size for industry at MIDI.

Detailed analysis of all shortlisted industries are captured as part of this report.

11.15.2. Sector selection for export diversification at MIDI

In the long-term, after cementing its position as a bulk and heavy industrial hub, MIDI may also attract export-oriented discrete manufacturing owing to established industrial and port-proximate ecosystem. The sector selection approach followed to identify suitable sectors for exports-diversification at MIDI is detailed in the section below.

Step 1 – Long-list of sectors

A preliminary long list of sectors was prepared basis focus exports sectors highlighted in Perspective Plan of Bangladesh (2021-2041), National Industrial Policy (2019) and case benchmarks of global port-led industrial hubs.

A total of 14 sectors were identified at this step, as shown in the exhibit below

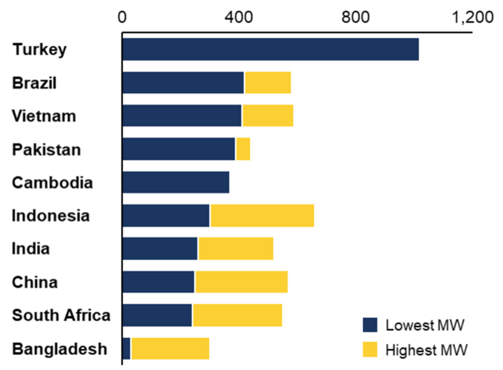
Exhibit 212: Long-list of sectors for assessment of export-diversification at MIDI

- Pharmaceuticals and API
- Shipbuilding
- Plastic products
- Electric and electronics
- Automobiles
- Synthetic fiber
- Cement
- Fisheries (including shrimps & prawns)
- Agri and food processing
- Furniture
- Jute and jute goods
- Leather and leather goods (including footwears)
- Home textiles
- RMG

Step 2 - Shortlisting of sectors basis labour competitiveness

The success of garments sector, which dominates the export basket in Bangladesh, is primarily driven by availability of labour at competitive prices. Further, Bangladesh has huge potential to increase the share of labour-intensive manufacturing in exports to increase its trade competitiveness. A study conducted by International Labour Organization in major garments producing countries also highlights the comparative advantage of labour availability in Bangladesh.

Exhibit 213: Statutory monthly minimum wages for garment producing countries (in USD)



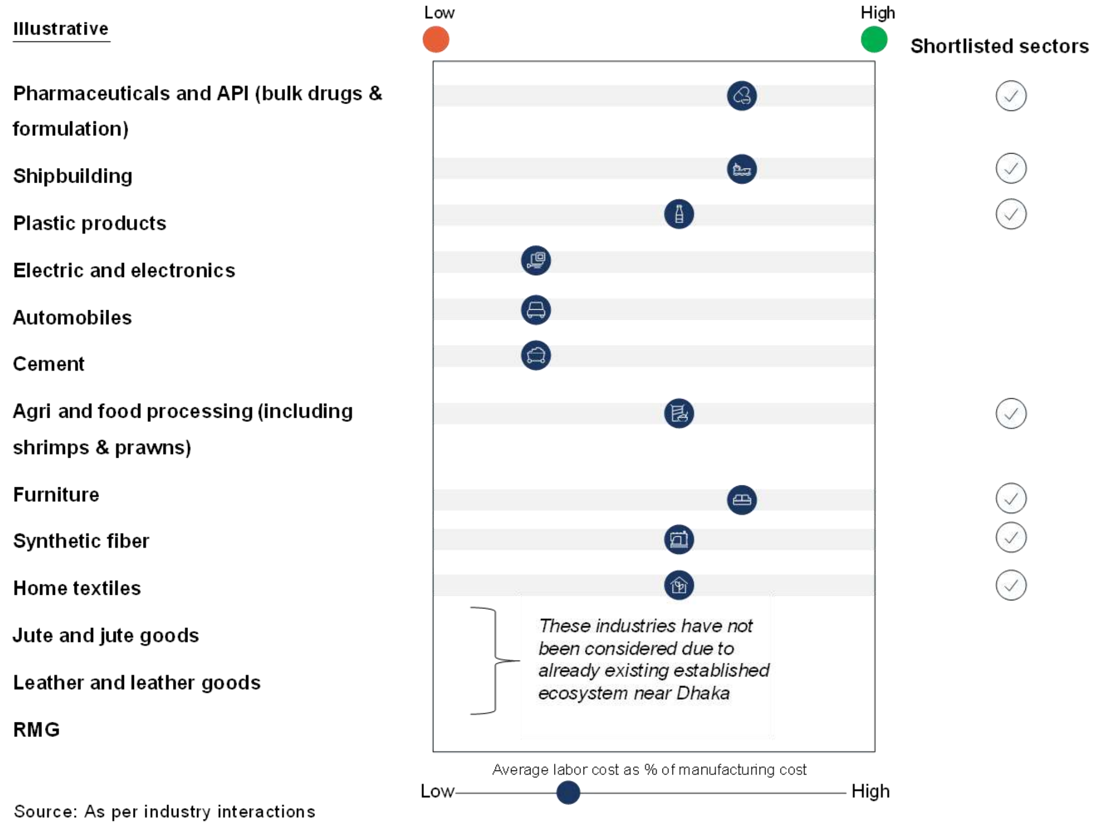
Published by International Labor Organization[196]

196 Source: Global comparative study on wage fixing institutions and their impacts in major garment producing countries, International Labour Organization

Hence, at step 2 the sectors were further filtered basis the comparative labour intensity – which provides an inherent export competitiveness to Bangladesh.

The exhibit below shows the relative comparison of labour intensity[197] in each of the sectors.

Exhibit 214: Relative comparison of labour intensity in Bangladesh



At this step, a total of 7 sectors were shortlisted including pharmaceuticals and API, shipbuilding, plastic products, synthetic fibres, agri and food processing, furniture and home textiles.

Step 3 – Shortlisting of sectors basis competitive advantages of MIDI

The final shortlisting of sectors was based on fitment of sectors to MIDI's endowments. The key parameters identified basis competitive advantages of MIDI are as below:

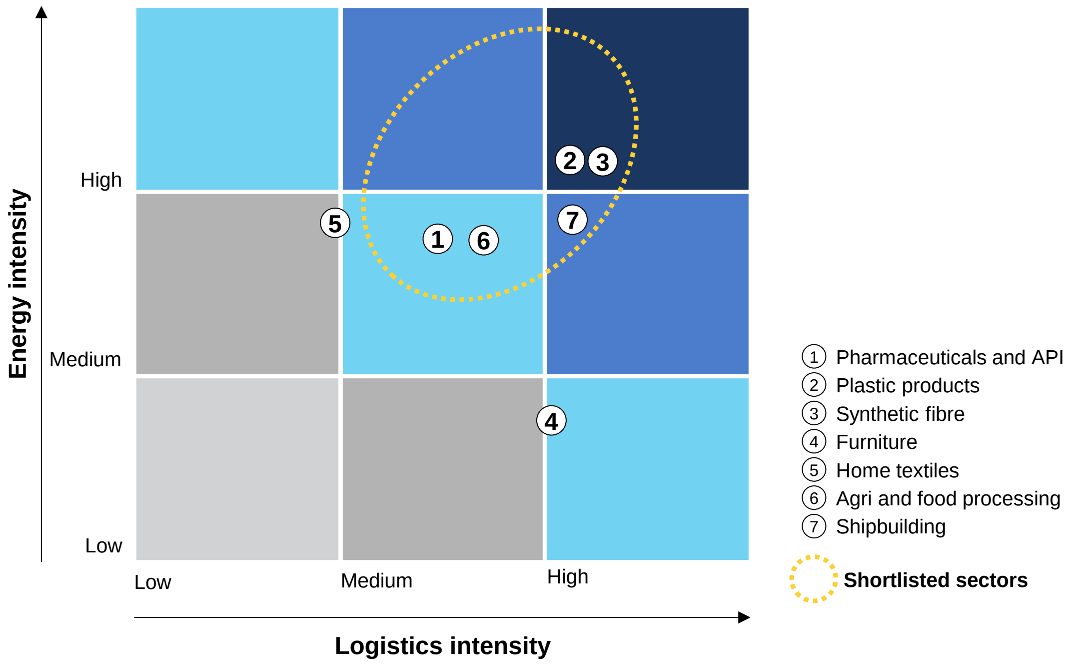
- **Logistics sensitive industries** with dependence on:
  - Import of raw materials
  - Raw material availability in vicinity of Moheshkhali
  - Synergies with domestic and value-added manufacturing industries proposed at MIDI in short-medium term

- **Energy dependent industries** – owing to large power generation and energy import infrastructure at MIDI

The shortlisted sectors from step 2 were further ranked on these parameters as below:

197 Source: Based on discussions with industry experts and analysis

Exhibit 215: Comparative analysis of select manufacturing sectors basis logistics and energy intensity for fitment at MIDI[198]



Source: As per industry interactions

Thus, the final list of shortlisted sectors (5 in nos.) for export diversification for MIDI include p**harmaceuticals & API, synthetic fibre, shipbuilding, plastic products, etc.**

The target for these sectors is assessed basis Bangladesh's export targets, factoring trade competitiveness, value chain competency, Govt incentives and international investor promotion. For this purpose, in medium-long term mid-sized industries for each of these sectors can be developed as the starting point at MIDI.

The report captures snapshot and size of selected sectors shortlisted for export-oriented manufacturing at MIDI. It is to be noted that the suggested sizing of the industries is based on the size of a typical plant(s) for each of these industries and may be expanded in future basis the exports growth and future targets of government.

198 Based on discussions with industry experts and analysis

11.16. Domestic / value-added manufacturing – back end

11.16.1. Cement complex

Demand scenario

Current domestic demand for cement in Bangladesh is estimated at ~33-34 MTPA (2020). Moreover, its per capita consumption stands at ~198 kg p.a., in comparison to the world average of ~560 kg p.a. With growth in economy, the cement consumption is expected to significantly increase over coming years.

Demand analysis	
Market Size (Volume)	~33-34
Supply analysis	
Locally manufactured cement (Raw material sourced via imports)	~33

All values are in MTPA

Installed capacity

Bangladesh has over-capacity in cement grinding. Griding units of cumulative capacity of ~58 MTPA already exist across the country. Further, ~11 MTPA additional supply is upcoming over next 4-5 years. Cement plants prefer to be near consumption centres and hence are regionally concentrated. ~45% of consumption happens in Dhaka, followed by Chittagong, Rajshahi, Khulna and Sylhet.

Large cement players occupy ~80% of the market. Barring LafargeHolcim plant, which is an integrated clinker manufacturing and cement griding plant, all other plants in the country are purely grinding units.

Key players	Regions	Capacity
Shah	Dhaka - Munishganj	6.1
King Bashundhara	Mongla	5.1
Fresh	Meghnaghat	3.6
Crown	Dhaka - Munishganj	3.3
7-Circle	Kaliganj	3.5
Premier	Chattogram, Munishganj	3.0
ScanRuby	Chattogram, Dhaka, Mukterpur	2.4
LafargeHolcim	Narayanganj, Chattak	4.2
Akij	Narayanganj	1.2
Confidence	Chattogram	1.1

All values are in MTPA

Raw materials for cement manufacturing

Bangladesh has no limestone availability and is dependent on imports for all the raw materials (clinker, gypsum, limestone and ash).

Most raw materials are imported at Chittagong / Mongla port in 40,000-60,000 DWT bulk vessels, discharged at Kutubdia / outer anchorage of Chittagong and carried to Dhaka in smaller barges[199].

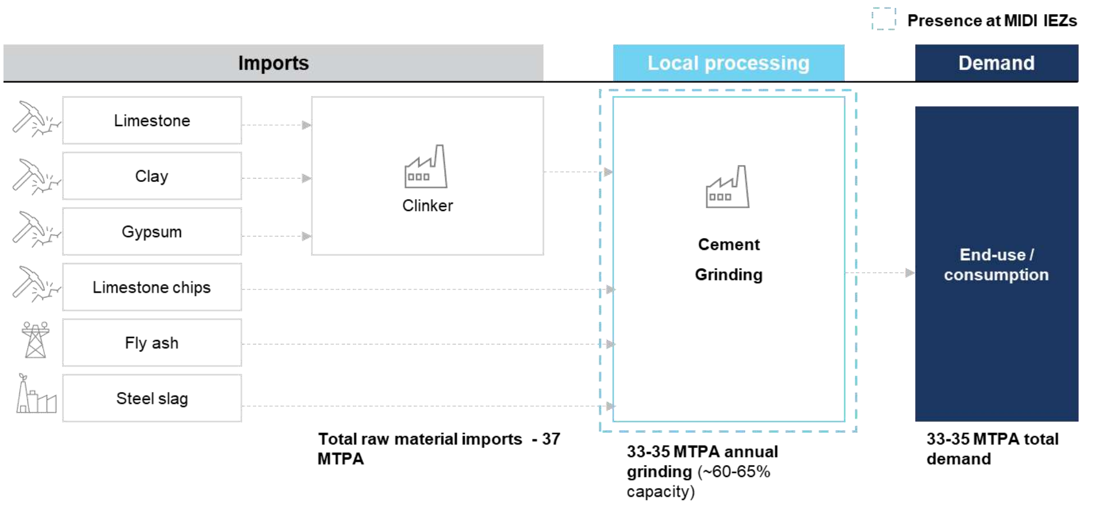
Raw material imports (Mainly from Thailand, Indonesia, UAE, and India)	**~37.6**
Portland Cement Slag *[HSC: 2523]*	~25.5
Limestone and flux *[HSC: 2521]*	~8.6
Others (gypsum etc.)	~3.6
Fly ash	~4.6

All values are in MTPA

[199] Lafarge's Sylhet plant gets limestone from captive mine in India

The exhibit below shows the value-chain of steel industry in Bangladesh.

Exhibit 216: Value chain of cement industry in Bangladesh



Notes:
Clinker imports from Thailand and Indonesia
Slag imports from India, China and Japan
Limestone imports primarily from UAE / ME
Slag imports from China, Indonesia, India, Japan

Future demand estimation

The demand projection for cement is done basis IEPMP in-between scenario (7.8% GDP growth) x 1.1 cement elasticity[200] – 8.6% p.a. cement growth. The table below shows demand estimation for 2030 and 2041.

Exhibit 217:Future demand estimation for cement industry in Bangladesh

	2021	2030	2041
MTPA Cement Demand	33.0	75.2	171
Domestic Manufacturing[201]	**33.0**	**75.2**	**171.2**
Existing capacity incl. upcoming capacity	58.0	69.0	69.0
Visible production[202]	33.0	51.8	51.8
Manufacturing Gap		**36.4**	**132.4**
Manufacturing Capacity to be setup[203]		**48.5**	**176.5**
Raw material required for total domestic production[204]		82.7	188.3

All values are in MTPA

Cost competitiveness of cement manufacturing at MIDI

Given its port-proximate location, MIDI's competitiveness was explored for multiple aspects in the cement value chain:

- Integrated clinker manufacturing and cement grinding plant based on imported limestone
- Cement grinding plant based on imported raw materials

[200] Basis long term elasticity values of in other developing south Asian countries
[201] Domestic grinding assumed to cater to 100% of demand in the country.
[202] Assuming 70%-80% production efficiency and capacity utilization
[203] Actual production taken as 70-80% of installed capacity
[204] . 1.05-1.1 times manufacturing capacity

Integrated cement plant
Clinker manufacturing may not be economically viable at MIDI, since logistics costs for imported limestone for clinker manufacturing far outweighs lower processing costs in Bangladesh. **As per estimates and industry interactions, cement grinding from imported clinker has 8-10% cost advantage as compared to import of limestone from UAE / ME for manufacturing of clinker and cement in Bangladesh**. Hence, clinker manufacturing at MIDI may not be suitable in short-medium term.

Cement grinding plant
Given, logistics sensitivity, most grinding units in Bangladesh are riverine plants located around demand centres.

Hence, in line with its competitiveness, MIDI will be to cater to demand of Chittagong and Cox's Bazar region.

Cost of cement grinding and delivery to nearby catchment from MIDI is estimated as USD 95-100/ton, as against USD 100-105 /ton in Chittagong.

Hence, there is potential for ~USD 7 / ton savings at MIDI.

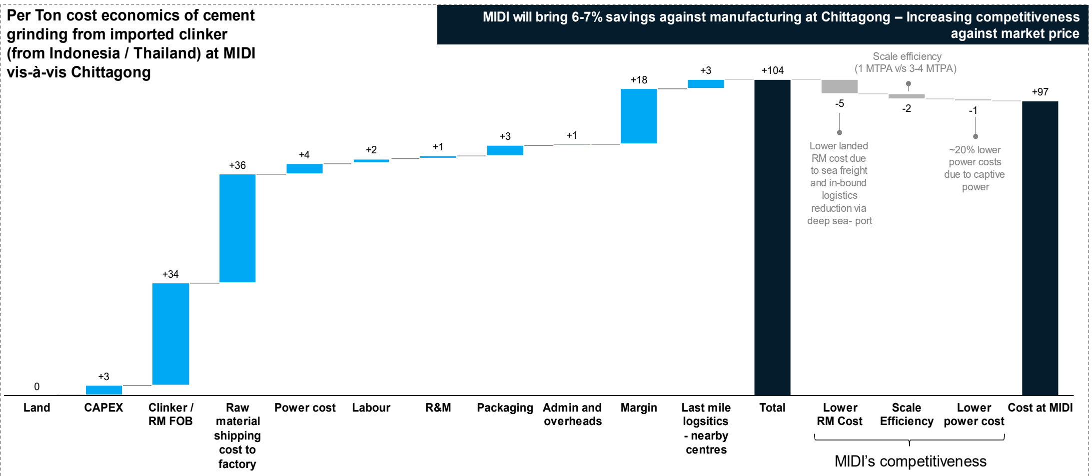
- ~**USD 4-5 / ton savings in shipping costs and raw material logistics** due to larger vessels calling at MIDI and elimination of the need of multiple lighterage
- **~USD 2/ ton savings due to economies of scale**
- **~USD ~1-2/ ton captive power savings**
- Similar last mile costs as grinding plants serve nearby catchments only

This gives MIDI advantage over domestic market, which is currently pegged at USD ~110-120 /ton for cement in Dhaka.

Exhibit 218: Cost competitiveness of MIDI in cement grinding (OPC cement)[205]

All values in USD / ton	**Current (~1 MTPA Chittagong)**	**Proposed Plants at MIDI (3-4 MTPA)**
Landed cost of RM per ton output	**69**	**65**
Clinker FOB Price[206]	32	32
Customs	8	8
Sea freight and inland logistics[207]	26	21
Input factor[208]	*1.05*	*1.05*
Fixed + variable operating costs[209]	**13**	**12**
Margins (@22%)	**18**	**17**
Logistics to nearby centres	**3**	**3**
Landed price at nearby consumption centres	**100-105**	**95-100**

[205] OPC cement 95% clinker + 5%gypsum
[206] Clinker FOB price from Indonesia / Thailand
[207] Includes CIF + shipping + port charges and inland logistics up to factory
[208] To account for other raw materials including gypsum
[209] Includes all fixed (CAPEX / depreciation, land lease, R&M, fixed OPEX, admin and overheads, etc.) and variable costs (power, labor, packaging, etc.) - verified basis in house experts and discussion with private players in Bangladesh



1. RM FOB and shipping corresponding to 1.05 tons of clinker to account of other raw materials like gypsum; RM freight costs includes customs and Govt
2. Power cost @35 KWH consumption per ton of output
3. Admin and overhead costs include general administration, plant overheads and sales & marketing
4.. 22% margin basis benchmarks in Bangladesh

Opportunity at MIDI

As highlighted earlier, cement plants are expected to remain concentrated in Dhaka and Chittagong near demand centres. However, MIDI can cater to the captive demand in the region owing to cost competitiveness. Hence, MIDI may house a small cement complex.

- **Manufacturing capacity target for MIDI by 2041 – ~10-11 MTPA**
  - Land requirement – ~150-200 acres
  - Power requirement – ~70-75 MW
  - Employment generation – ~3,300-3,500 jobs

MIDI can capture, 5-7% Bangladesh's cement demand, in 2041.

Road map for Cement Manufacturing at MIDI

Parameters	2030	2035	2041
Capacity (MTPA)	2-3 green field grinding units to come up at MIDI; low starting capacity expandable up to 3-4 MTPA each	Brownfield expansion of existing units + additional green field units	3-4 facilities at MIDI with combined capacity of 10-11 MTPA Clinker manufacturing unit may be considered
	4-5	7-8	10-11
Products / value chain	Grinding capacity to be setup based on import of clinker. MIDI grinding units to cater to in-house and nearby catchment demand. Clinker manufacturing unit may be considered by 2041.		
Enablers	Fully operational mechanized bulk berth (phase I) to handle clinker imports	Established industries within MIDI supplying by-products for cement manufacturing. e.g. – fly ash from power plants, slag from steel plants, etc. will make MIDI region highly competitive for cement manufacturing	
Cumulative Investment required (USD Mn, 2022 prices)	250-300	450-500	650-700
Target investors	Large domestic players (Shah, Bashundhara, Fresh, etc.) can expand beyond Chittagong and cater to MIDI and Cox's Bazar demand	Large international cement players with clinker units in nearby countries (India, Thailand, etc.) can potentially come in medium term - Adani, Lafarge, etc.	

11.16.2. Food processing cluster

Food processing cluster at MIDI would cater to:

- Edible soya oil crushing and refining
- Sugar refining
- Salt refining

Edible Oil

Total oil demand in Bangladesh is ~3-3.1 MTPA. Bangladesh consumes mainly two types of edible oils - palm oil and soyabean oil.

Exhibit 219: Edible oil demand in Bangladesh

Palm oil consumption	**1.5-1.6 MTPA**
Per capita consumption	10 Kg p.a.
Soyabean oil consumption	**1.2 MTPA**
Per capita consumption	7.5 Kg p.a.
Others (including sunflower oil)	**0.2 MTPA, 2020**
Total oil demand	**3-3.1 MTPA**

Palm Oil

Demand-supply scenario

Demand for palm oil in Bangladesh is currently ~1.5-1.6 MTPA. On the supply side, Bangladesh has limited production of refined palm oil. In FY2020, Bangladesh imported <0.2 MTPA of crude palm oil. This is due to the following reasons:

- Currently, export duty structure from palm producing nations of Indonesia and Malaysia encourages inhouse refining industry in their respective countries.
  Indonesia and Malaysia have traditionally kept high export duties on crude palm and low export duties on palm olein (finished product) – thus encouraging offtake of refined oil by various importing nations including Bangladesh.

- Globally, palm oil business margins are driven by backward and forward integration of manufacturing capacities. Most producers globally (Wilmar, Cargill, Emery, P&G, IOI) have integrated plantations, oil refining units, oleochemical production units, which make their margins competitive against just oil refining units.

- Further, Bangladesh's import duties on crude palm oil (10% Customs Duty + 15% VAT) are higher than import duties on refined palm oil (0 Customs Duty + 15% VAT)

Hence, Bangladesh mostly imports its refined palm oil from Indonesia and Malaysia.

Future demand estimation

Bangladesh's oil consumption is expected to grow at a similar growth rate as population, at 0.7-0.8% p.a. Hence, total oil demand by 2041 is expected to reach to ~3.5-4 MTPA. Palm oil is the preferred oil for lower- & middle-class segments due to affordability. Palm oil consumption / demand is hence expected to constitute 45-50% of total oil demand i.e., 1.8-2 MTPA by 2041.

Opportunity for MIDI

In future, MIDI can house a crude palm oil refining unit catering to country's demand as its proximity to deep seaport enables easy import export. However, competitiveness will primarily be dependent on duty structure of the Bangladesh govt. and origin countries. Basis discussions with private sector, it seems unlikely that palm oil manufacturing will be cost economical given the uncertainties on import duties. Hence, palm oil refining is not considered at this juncture.

Soyabean Oil

Demand-supply scenario

Demand for soyabean oil in Bangladesh is currently ~1.2 MTPA. On the supply side, Bangladesh carries most of its production inhouse by importing crude soyabean oil/ soyabean seeds.

Demand analysis (FY22)	
Market Size (Volume)	~1.3
Supply analysis	
Crude degummed soyabean oil refining	~0.75
Soyabean crushing	~0.5

All values are in MTPA

Installed capacity

Bangladesh currently has ~50+ refineries engaged in import of crude degummed soybean oil to produce refined soybean oil for the domestic market.

Further, large players dominate the market of soyabean crushing & refining capacity.

Key players	Crushing Capacity (TPD)
City group	7,000
Meghna Group	>5,500
Others include Bangladesh edible oil limited, TK Group, Jamuna Group, KBC Group etc. with units of size 1,200-3,000 TPD.	
Total crushing capacity	**~19,500**

Most of the producers are located on river side in south Dhaka (around Narayanganj) and utilize river barges to transport whole soybeans directly to their facilities.

Raw materials for manufacturing Soyabean Oil

Bangladesh imports both crude soyabean oil and soyabean to produce soyabean oil (finished product).

Domestic soyabean production (FY22)	**0.14**
Imports (FY22)	**~3.3**
Crude + refined soyabean oil (mainly from Argentina- 75%, Paraguay- 13%, Brazil- 9%)	~0.75
Soyabean (mainly from USA- 43%, Brazil- 36%, Canada- 14%)	~2.6

All values are in MTPA

Soyabean crushing process

Soyabean crushing process is explained below. The process results in two main products – soya meal (~80%) and soya oil (~18-20%).

Soya meal is used as animal feed.

- Demand in Bangladesh - ~2.5 MTPA
- Produced from soyabean crushing - ~2.17 MTPA
- Imported soya meal - ~0.3 MTPA (USA and India)

Exhibit 220: Soyabean crushing and refining process

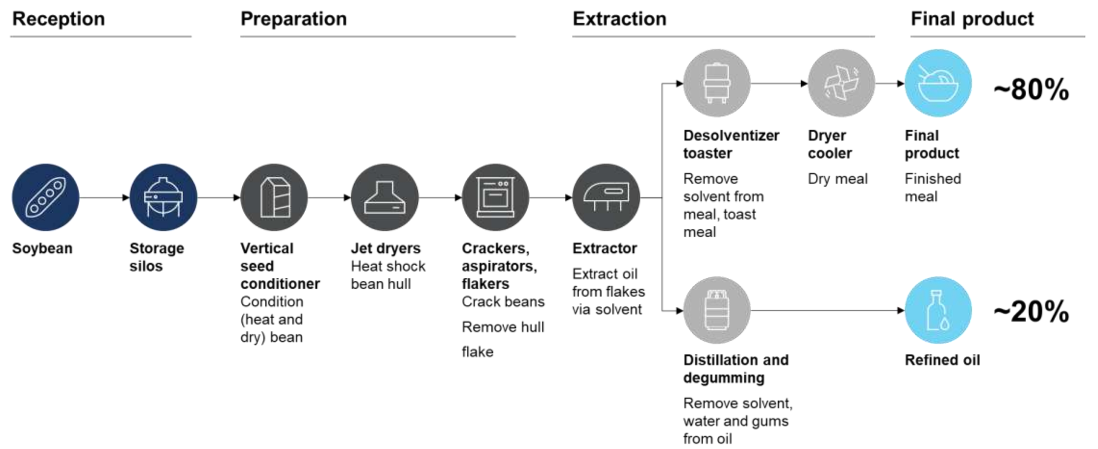
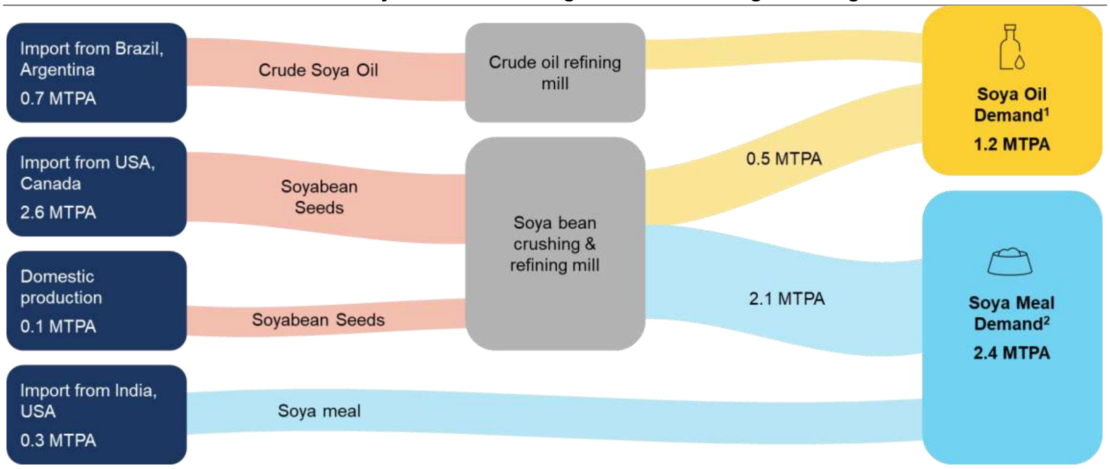


Exhibit 221: Material flow for Soyabean crushing and Oil refining in Bangladesh



Perspective on soya oil prices

Soya oil prices are market dependent and highly volatile. The government sets a maximum retail price (MRP) for soya oil, which gets set after discussions with oil refiners and traders.

Further, import duties on soya oil and soyabean are set to accommodate market trends. The current import duties incentivize soyabean crushing domestically.

Commodity & HS Code	Total Tax Incidence
Soya beans, whether or not broken other than Seed, Wrapped/canned up to 2.5 Kg (HS Code 1201.90.10)	25%
Soya beans, whether or not broken other than seed, EXCL. Wrapped/canned up to 2.5 Kg (HS Code 1201.90.90)	Nil
Soya Bean Flours and Meals (HS Code 1208.10.00)	15.25%
Crude Oil, Whether or Not Degummed (HS Code 1507.10.00)	20%
Refined Soya-Bean Oil (HS Code 1507.90.10)	20%
Other Soya-Bean Oil (HS Code 1507.90.90)2	26%

Future demand estimation

Bangladesh's oil consumption is expected to grow at a similar growth rate as population at 0.7-0.8% pa. Hence, total oil demand by 2041 is expected to reach to ~3.5-4 MTPA. Soyabean oil consumption/ demand is expected to increase to 45-50% of total oil demand i.e., 1.8-2 MTPA by 2041.

Cost economics of existing soyabean crushing and refining

Cost economics of existing soya oil industry is discussed below.

E. Cost economics of soyabean crushing and oil refining at Narayanganj

Total cost: USD 595-600 /ton of soyabean

- Soyabean FOB cost from USA Gulf of Mexico – USD 403 /ton
- CIF costs and river transport costs till Narayanganj – USD 98 / ton [inc. 0% customs]
- Processing costs and last-mile distribution costs – USD ~70 /ton
- Margin – USD 28-30 ton[210]

Soyabean is sold as soya meal (~80% output) and soya oil (~17.8% output); rest being waste.

Considering market price of soya meal (USD 460-475 /ton), market price for soya oil is derived as USD ~215-220 for 0.178 ton or USD 1,205-1,210 / ton of oil (i.e., Taka 175-180 / lt of oil[211])

[210] ~5%, as per industry standards
[211] Validated through industry interactions; Also, TCB selected Super Refinery Oil Limited for procurement of soya oil at Taka 177 /lt in Jan 2023; https://dailyasianage.com/news/301137/government-to-buy-165-crore-liters-soybean-oil

F. Cost economics of refining of imported crude degummed soya oil from Argentina

Total cost: USD 1,620 /ton of oil (Taka 235-240 /lt)

	USD /ton
Degummed Soya Oil - FOB at Argentina (13th Feb 2023)	**1328**
Freight till Chittagong	70
Degummed Soya Oil - CIF at Chittagong	1398
Import parity as per actual shipment	(100)
Import duty @20%	~260
Other import expenses (insurance, handling, port dues etc.)	20
Cost of transport till factory	8
Refining costs	30
Last-mile transport to Dhaka	5
Cost of imported Soya oil at Dhaka	USD 1620 /ton
	Taka 238 /lt

G. Cost economics of importing refined soya oil from Argentina

Total cost: USD 1,270 /ton of oil (Taka 187 /lt)

	USD /ton
Imported Refined Soya oil price - FOB Argentina[212]	**964**
Freight till Chittagong	70
Imported Refined Soya Oil - CIF at Chittagong	1034
Import duty @20%	207
Other import expenses	20
Last mile transport to Dhaka	10
Cost of imported Soya oil at Dhaka	USD 1270 /ton
	Taka 187 /lt

H. Retail price of soya oil

As per TCB, retail price of soya oil (1 lt packaged bottle) at Dhaka = USD 180-185 /lt (i.e., USD 1224-1,260 /ton)

Summarily, Bangladesh's current import duty structure incentivizes local crushing of soyabean. The local crushing industry is marginally competitive.

Cost competitiveness of soyabean crushing and refining at MIDI

MIDI will offer the following advantage for soyabean crushing and refining:

- **Lower landed cost of soyabean at factory**
  This will be contributed by lower shipping freight costs (due to larger vessels) and lower last mile transport cost till factor at MIDI. USD 15-17 /ton cost savings can be achieved at MIDI.

- **Better reliability and hence lower fixed costs with large plants of 6,000-7,000 TPD soyabean crushing capacity**[213]
  Reliability is a big factor for plant operational costs, since it impacts fixed cost loading on processing costs. Reliability of soya bean crushing plants depends upon number of days of operations and capacity utilization, which further depends upon availability of soyabean for continuous operations. Bangladesh plants have suffered due to capacity under-utilization over last 1 year (most plants operating at <60% capacity) because of soyabean price volatility.

  MIDI plant, with larger land availability & port proximity, can address this by storage of soyabean grains to counter price volatility risks. Hence, greater plant reliability can be achieved.

- **Lower power costs due to captive power availability at MIDI**
  Power plants at MIDI will be able to provide power to manufacturing Hub at much lower rates than grid tariff. It is assessed that ~18-20% lower tariff can be achieved.

Together, the factors above can create a 8-10% cost advantage in production

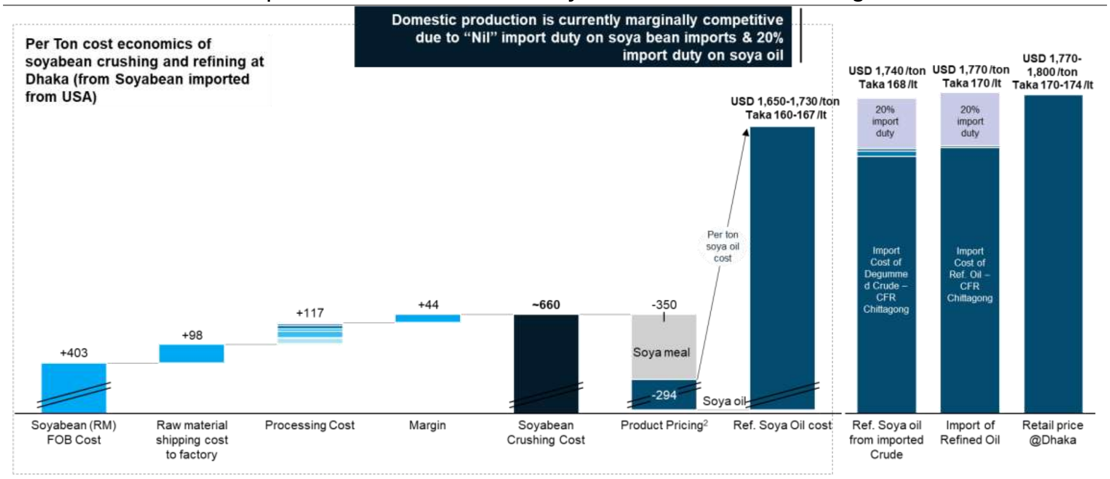
[212] Dec 2022 – Procurement price of TCB; https://www.risingbd.com/english/business/news/92018#:~:text=Bangladesh%20is%20going%20to%20import,liter%20bottles%20in%20the%20country

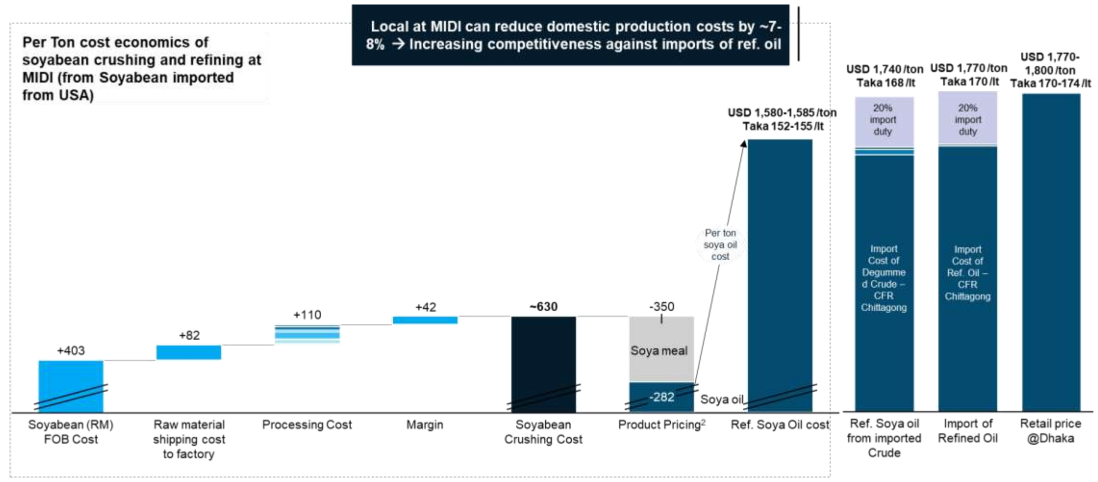
[213] Reliability is a large factor for plant operating margins in soya bean crushing. Hence, larger units are not preferred around the world. Maximum size of soya crushing facilities are 6,000-7,000 tons per day in China.

cost of soya crushing and soya oil over the current ecosystem near Dhaka.

This can give an added advantage over the import costs of refined / crude soya oil, even with lower import duty protection.

Exhibit 222: Cost competitiveness of MIDI in Soyabean oil manufacturing





Comparative analysis (USD /ton)

	Current @ Narayanganj	MIDI	Difference
FOB price soyabean @ USA Gulf of Mexico	***403***	***403***	
Transport and Logistics costs till Factory	***98***	***82***	*16.2*
Shipping charges	70	57	
Insurance and commission charges	19	18	
Ship unloading and port dues charges at MIDI	1	1	
Customs TTI including customs duty, VAT, AIT etc.	-	-	
Truck / barge loading charges	1	1	
Transport cost to factory within MIDI	6.0	3.3	
Truck / barge un-loading charges	1	1	
CAPEX & Land	***5.8***	***4.6***	*1.2*
Other Operating costs	**65**	**61**	**~4**
Power	*9*	*7*	*1.7*
Natural gas	*4*	*4*	*0.0*
Other consumables (methanol etc.)	*3*	*2*	*0.1*
Labor	*5*	*5*	*0.0*

Packaging	*24*	*24*	*0.0*
R&M	*2.6*	*2.2*	*0.4*
Admin and overheads	*14*	*11*	*2.3*
Last mile logistics	*5*	*5*	*0.0*
Margin	28	27	*1.0*
TOTAL COSTS – Soyabean crushing & refining per ton	**595**	**573**	
Price of soymeal - 0.8 tons	380	380	
Required revenue from oil – 0.178 ton	215	193	
Required revenue from oil -1 ton	USD 1,205 /ton	USD 1,083 /ton	
Required revenue from oil in TK / L	**Taka 177 /lt**	**Taka 159 /lt**	

Opportunity at MIDI

As confirmed in interaction with edible oil refining players in Bangladesh, plants prefer to be closer to demand centres due to availability of packaging and distribution ecosystem. Hence, MIDI could potentially cater to demands of Chittagong & Cox's Bazar region.

MIDI can house a large soya crushing and refining unit of capacity 6,000-7,000 TPD (translating to ~0.5 MTPA soya oil).

This will imply the following:

- ~25% of Bangladesh's soya oil demand in 2041.
- Land requirement – ~60-70 acres
- Power requirement – ~10 MW
- Employment generation – ~450-470

Sugar refining

Demand-supply scenario

Total sugar demand in Bangladesh is currently at ~2.2-2.3 MTPA. On the supply side, Bangladesh fulfils most of its demand by local manufacturing. It only imports ~0.1 MTPA of white refined sugar (finished product).

Demand analysis	
Market Size (Volume)	~2.2-2.3
Supply analysis	
Refining from imported raw sugar (Mostly from India, Argentina, Brazil, Thailand)	~2-2.1
Manufacturing from locally grown sugarcane	~0.05-0.1
Import of white sugar	~0.1

All values are in MTPA

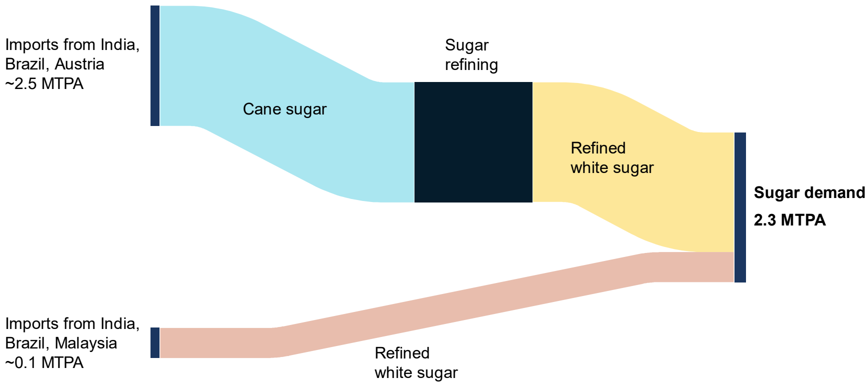
Installed capacity

Bangladesh currently has 15 state-owned refineries under Bangladesh Sugar and Food Industries Corporation (BFSIC) engaged in domestic manufacturing of sugar from locally grown sugarcane.

Most of the large players undertake sugar refining by importing raw sugar. These players include:

Key players	Crushing Capacity (TPD)	Region
City group	~2,500	Chittagong
Meghna Group	~3,000	Narayanganj
Others include City group (Narayanganj), Deshbandhu group (NW Dhaka), Abdul Monem group (Narayanganj)		

Exhibit 223: Value chain for sugar refining in Bangladesh



Future demand estimation

In future, import of raw sugar and domestic refining is expected to continue to meet local demands.

Bangladesh's sugar demand is expected to grow at a similar growth rate as population, at 0.7-0.8% p.a. Hence, total demand for sugar by 2041 is expected to reach to ~2.5 MTPA.

This will also translate to raw sugar imports of ~3 MTPA (considering refining losses).

Cost competitiveness of sugar refining industry

MIDI can capture suitable share in refining to serve the Chittagong-Cox's Bazar catchment. Moreover, given its proximity to deep seaport, MIDI can enable logistic cost efficiencies. Hence, sugar refining at MIDI can be competitive.

Basis a cost economics analysis (for oct 2022[214]):

- Production cost of sugar at MIDI: Taka 98-100 /Kg (USD ~932-935 /Ton)
- Present production cost around Dhaka: Taka 99-105 /Kg (USD ~946-950 /Ton)
- Cost of imported refined white sugar from India: Taka 98-100 /Kg (USD ~935-940 /Ton)
- Retail selling price of ref. sugar at Dhaka (as published by Trading Corporation of Bangladesh): Taka 110-120 /Kg (USD 1048-1050 /Ton)

[214] Costs taken for Oct 2022 since import duties after Oct 2022 were removed temporarily to control sugar prices. In long-term, import duties on sugar are expected to continue.

Hence, sugar refining at MIDI is marginally competitive to that at Dhaka. Having said that, import of refined white sugar is going to be much more cost competitive, unless the government imposes higher import duties.

For example, India, which is one of the chief sugar exporters (other than Brazil, which world's largest exporter), exports both raw sugar and white sugar in equal quantities to countries in Middle East and Europe. Competitiveness of domestic sugar refining in Bangladesh will always be subject to import barriers imposed by the government.

Exhibit 224: Cost competitiveness of sugar refining at MIDI

#		Cost in USD / ton
1	**FOB cost - Raw sugar from India**	475
2	Freight charges till Matarbari Port	6
3	Insurance and commission charges[215]	19
4	**CIF cost till MIDI[216]**	**500**
5	Ship unloading and port dues charges	3
6	Customs TTI including customs duty, VAT, AIT etc.[217]	215
7	**Landed price of raw sugar at MIDI Port[218]**	**718**
8	Truck loading charges	3
9	Transport cost to factory within MIDI	3.5
10	Truck unloading charges	3
11	**Landed price at MIDI factory[219]**	**728**
12	Processing costs	109
13	Operating margin	42
14	**Ex-factory price at MIDI[220]**	**878**
15	Transportation cost up to Chittagong region	10
16	**Landed cost at consumption centre[221]**	**888**

Opportunity at MIDI

MIDI can leverage its proximity to deep seaport and can house a 0.7-0.8 MTPA cane sugar refining complex.

- ~30% of Bangladesh's 2041 demand
- Land requirement – ~40-50 acres
- Power requirement – ~10-11MW
- Employment generation – ~1,000-1,200

[215] 0.5% each + 15% VAT

[216] CIF cost till MIDI = FOB cost + Freight charges + Insurance and commission charges

[217] Taka 3000 per ton + VAT (15%) + Regulatory Duty (20%)

[218] Landed price at MIDI port = CIF cost till MIDI + Ship unloading and port dues charges at MIDI + Customs TTI

[219] Landed price at MIDI factory = Landed price at MIDI port + Truck loading charges + Transport cost to factory within MIDI + Truck unloading charges

[220] Ex-factory price at MIDI = Raw material requirement per ton of finished product + Processing costs at MIDI + Operating margin

[221] Landed cost of finished product in Dhaka = Ex-factory price at MIDI + Transportation cost up to Dhaka

Salt refining

Demand-supply scenario

Total salt demand in Bangladesh is currently at ~2.35 MTPA[222]. On the supply side, Bangladesh produces ~1.8-2 MTPA.

Current production and raw materials

Salt manufacturing in Bangladesh is steadily increasing, thus reducing the reliance on imports. Major salt producing areas in Bangladesh are Maheshkhali, Kutubdia, Teknaf, Pekua, Chakaria, Cox's Bazar. Crude salt from above regions is delivered to salt refineries for further processing. From South Chittagong, barges are used to transport crude salt to refineries, where it is processed, packaged and distributed. Major players in Bangladesh includes ACI salt (vicinity of Dhaka), Molla Salt (Narayanganj), and Fresh Salt, Meghna Group (Meghnaghat) amongst others.

Future demand estimation

Bangladesh's salt demand is expected to grow at a similar growth rate as population, at 0.7-0.8% pa.. Hence, total demand for sugar by 2041 is expected to reach to ~2.7-2.8 MTPA.

Opportunity at MIDI

MIDI can leverage its proximity to salt producing regions mentioned above and can house a salt refinery. However, cost of transport of bulk / break-bulk crude salt via barges to Dhaka will be slightly cheaper as against transport of packaged finished salt (after processing at MIDI). Hence, MIDI will only be able to cater to immediate catchment's demand.

A capacity target ~0.7-0.8 MTPA is taken for MIDI by 2041.

- ~30% of Bangladesh's 2041 demand.
- Land requirement – ~40-50 acres
- Power requirement – ~10-11 MW
- Employment generation – ~1,000-1,200

Road map for food processing at MIDI

Parameters	Description
Capacity (MTPA)	Greenfield units to be setup. Food processing units to primarily cater to MIDI's catchment demand for - Edible oil (soya) - crushing cum refining units - Sugar - refining units - Salt - refining units Demand for such consumption goods is expected to growly slowly in line with population growth. Hence, early movers will have an advantage in terms of catering to regional / catchment demand.
	Edible oil (soya) - 0.6; Sugar - 0.8; Salt - 0.8
Products / value chain	Edible oil - import of soya seeds to be crushed and refined into edible oil Sugar - refining of imported cane sugar Salt - refining of locally procured raw salt
Enablers	1. Provision of supporting units within MIDI; example - plastic packaging for FMCG industries, etc. 2. Fully operational bulk berths to handle soya seed imports
Cumulative Investment required (USD Mn, 2022 prices)	30-35
Target investors	1. Small scale of units proposed to be setup at MIDI - may not attract international investors. Local players like TK, Meghna, etc. primary targets. 2. Further, MoI is looking to setup new sugar refineries (given existing refineries are far away from Chittagong port). MIDI may be suitable location for greenfield refineries.

[222] https://www.thedailystar.net/business/economy/news/salt-production-hits-61-year-high-3020891

11.16.3. Fertilizer complex

Fertilizers

Bangladesh's fertilizer consumption is amongst the highest in the world at ~286 kg/ ha, in comparison to the world average of ~122 kg/ ha (consumption in India is at ~170 kg/ ha, and that China is ~350 kg/ha)[223]. Hence, consumption is expected to increase at a moderate rate going forward. There are two major types of fertilizers in Bangladesh - urea and DAP.

	Demand	Production	Import
Urea	2.45	1.4	1.1
DAP	1.5	0.1	1.4
MOP	0.8	-	0.8
TSP	0.7	0.1	0.6

All values are from 2021 and in MTPA

While the demand for DAP in Bangladesh is increasing significantly over the years, demand has been flat for urea. Other fertilizers like TSP and MOP have a demand of ~0.7-0.8 MTPA and have shown growth over the years.

Urea

Demand-supply scenario

The demand for urea in Bangladesh is currently at ~2.4-2.5 MTPA, with a CAGR of -1% over the past 10 years. Of the total demand, ~1.4 MTPA is fulfilled by domestic production. Hence, the current manufacturing gap is at ~1.1 MTPA. This is currently being met through imports.

Demand analysis	
Market Size (Volume)	~2.4-2.5
Supply analysis	
Domestic production	~1.4
Import of Urea	~1.1

All values are in MTPA

Installed capacity

As stated earlier, Bangladesh currently produces ~1.3 MTPA of urea. It is estimated that it's total production capacity from existing / planned units would be ~1.4 MTPA by 2041.

- 4 operational plants under Bangladesh Chemicals Industries Corporation (BCIC, under Ministry of Industries) with a capacity of ~0.8 MTPA production:
  - AFCCL, CUFL, JFCL – The three plants have a total capacity of ~1.6 MTPA (production only ~0.45 MTPA). The plants are old with limited capacity utilization and are likely to shut soon.
  - SFCL – a relatively new and operational plant with 0.6 MTPA capacity (production ~0.4 MTPA).

- 1 under construction plant under BCIC with production of ~0.7 MTPA:
  - Ghorasal Polash Urea, located in NW of Dhaka
  - 2025 exp completion
  - Capacity of ~0.925 MTPA capacity (i.e., ~0.7 MTPA production).

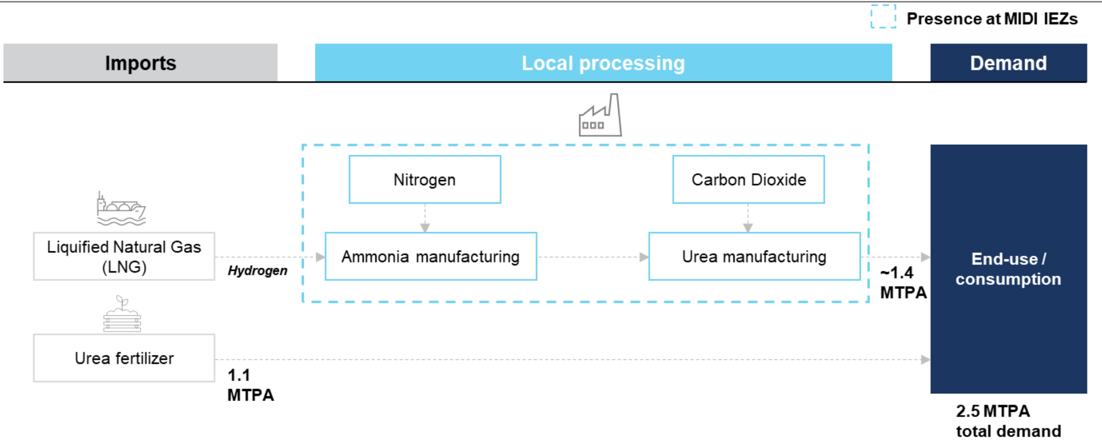
- KAFCO plant established as a JV between GoBD, Japan and EU with a capacity of 0.7 MTPA (~0.5 MTPA production).

Raw materials required for Urea manufacturing

For urea, Bangladesh is currently dependent on LNG imports / locally available LNG as a key feedstock. Imported LNG is blended with domestic gas and supplied at Taka 12-15 / cum as of Jan 2023.

[223] https://ourworldindata.org/grapher/fertilizer-per-hectare?country=OWID_WRL~CHN~USA~GBR~IND~BRA~NGA~European+Union~GHA~ECU~BGD

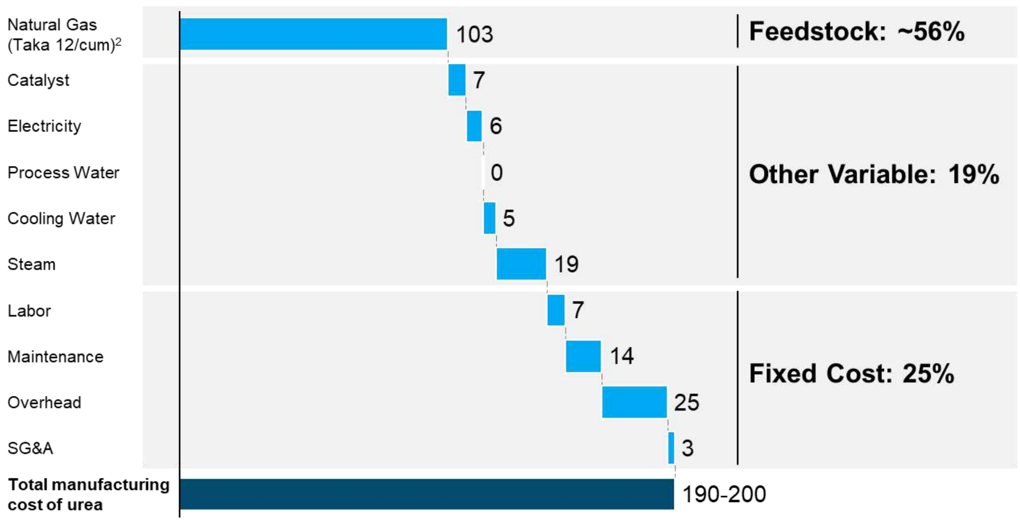
Exhibit 225: Value chain for urea manufacturing in Bangladesh



Cost competitiveness of Urea manufacturing in Bangladesh

Urea is highly sensitive to LNG procurement price. With current procurement price (Taka 12-15 per cum), the production costs of urea in Bangladesh come to USD 190-200 /ton[224], as against govt's subsidized sale price of USD 220 /ton[225].

Exhibit 226: Urea manufacturing costs[1] in Bangladesh (USD/ton)



1. 800 kta urea plant 2. While long term gas import price is 9.08 USD/MMBTU, as discussed with private players government supplies LNG at TK 12-14/cum (~3.3-3.5 USD/MMBTU) after blending with domestic natural gas

Further, urea production costs are much lower in gas rich countries like Middle East. As indicated in exhibit below, players on right hand side of cost curve (India, Bangladesh) place marginal units into the global market, matching supply with demand, and setting a price floor. But margins are highest for players on left side of cost curve (like Middle east), which enjoy low gas or coal prices.

Hence, urea production within Bangladesh may only make financial sense with reasonable LNG procurement price.

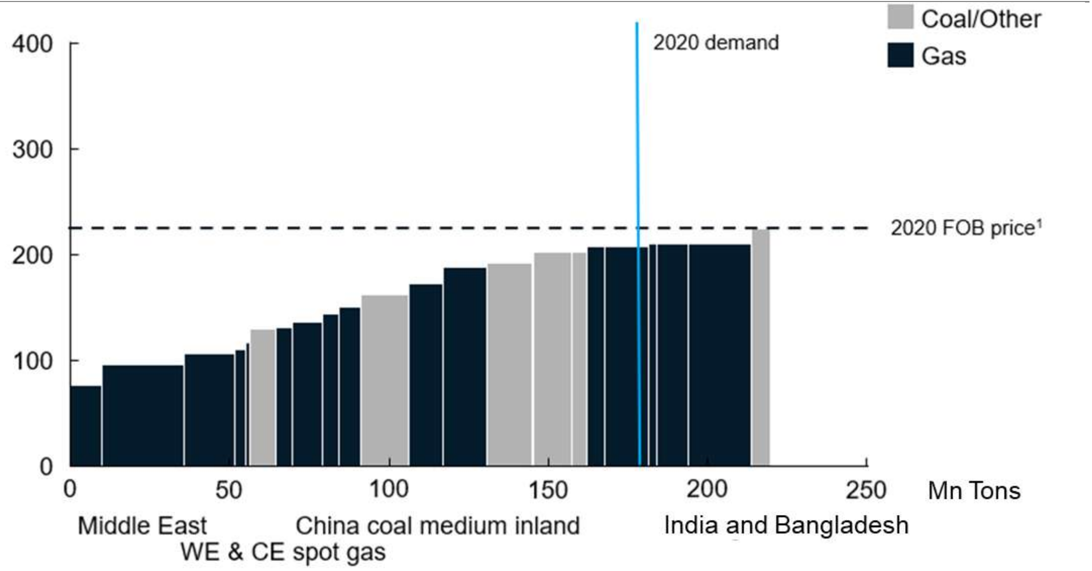
Having said that, urea is an essential commodity and hence, manufacturing within the county is important for agriculture security perspective.

[224] As indicated by KAFCO

[225] @ BDT 22 / kg – post latest price increase in August 2022

Also, as discussed above, much of BCIC's existing capacity is in poor condition and expected to retire soon. In such mid-term scenario, 0.9-1 MTPA capacity gap will exist in Bangladesh between demand and domestic production (incl. KAFCO).

Exhibit 227: Urea plant gate cash costs (USD/ton) in 2020



Opportunity at MIDI

MIDI, with benefit of LNG imports, will be best for replacement capacity within Bangladesh.

MIDI may target a mid-sized urea plant of ~0.8 MTPA (production of ~0.6 MTPA)

- Land requirement – ~140-150 acres[226]
- Power requirement – ~35-40 MW
- Employment generation – ~3,000-3,200

DAP

Phosphate based fertilizers like DAP and TSP are growing in demand in Bangladesh. However, owing to lack of ores/ deposits required for manufacturing phosphate based complex fertilizers, these fertilizers are largely imported.

- Estimated production cost of DAP in Bangladesh via imported rocks and minerals (as estimated by KAFCO): USD 300-350 /ton
- As against this, import of DAP from raw material rich countries may cost USD 250-290 /ton
- Subsidized selling price of DAP in Bangladesh: USD 200 /ton

Hence, import of DAP might be economical in long term. In this context, manufacturing of phosphate-based fertilizers has not been considered at MIDI.

Road map for fertilizer complex at MIDI

Parameters	2030	2035	2041
Capacity (MTPA)	MIDI best suited to setup urea plant to minimize urea imports into Bangladesh One 0.7-0.9 MTPA urea may be setup at MIDI with imported LNG as feedstock to produce ammonia and further process it into urea		Downstream industries utilizing ammonia as key feedstock may come up in MIDI over medium-long term (chemicals, textiles, pesticides, water purification, etc.)

[226] Benchmarked to KAFCO plant of 0.7 MTPA capacity with area 135 acres

Parameters	2030	2035	2041
		0.7-0.9 MTPA	
Products / value chain	Ammonia and further urea manufacturing by use of imported LNG		
Enablers	For LNG imports, existing FSRU capacity sufficient; provision of land-based LNG regasification terminal needs to be considered by 2041		
Cumulative Investment required (USD Mn, 2022 prices)	550-600		
Target investors	BCIC can provide licenses to KAFCO and other international private urea manufacturers		

11.16.4. Petrochemicals and chemical products

This section is in continuation of polymers and petrochemicals section under the Manufacturing Hub section.

Currently, Bangladesh is largely dependent on imports of chemicals and chemical products. The total demand for finished chemicals in Bangladesh is USD ~3.4 Bn.

Demand analysis	
Market Size	~3.4
Supply analysis	
Domestic production	~0.8
Imports	~2.6

All values are in USD Bn.

Chemicals can majorly be classified into two types:
- Organic Chemicals
- Inorganic Chemicals

Organic Chemicals:
These compounds / chemicals contain carbon-hydrogen or carbon-carbon bonds and are made from POL refining

These chemicals are used in medical, pharmaceutical, biochemical, or bioengineering applications. Further, they are also used for polymer and plastics production, as solvents for cleaning agents, and as various additives.

Organic Chemicals *[HSC: 2901 -2942]*	
Import value	**BDT ~10,300 Cr**
Import volume	**~0.4 MTPA**

Inorganic Chemicals:
These compounds / chemicals lack carbon-hydrogen bonds
These chemicals are used in paint industry, glass industry, automotive industry, detergent and soap industry, and paper and pulp industry.

Inorganic Chemicals *[HSC: 2801 -2853]*	
Import value	**BDT ~4,300 Cr**
Import volume	**~1.9 MTPA**

Opportunity at MIDI

Petrochemical Intermediate complex:
~30% organic chemicals are directly derived from petroleum or natural gas. Further, a lot of organic chemicals manufacturing processes also use crude derived basic petrochemicals as key feedstock.

Hence, with the proposed 8-10 MTPA refinery, a downstream petrochemicals complex with secondary units is best suited at MIDI. Due to the presence of upstream refining and petrochemical complex, MIDI shall enjoy abundant availability of by-products/derivates such as propylene, ethylene, butylene, n-butane, toluene, etc.

In this context, related industries where these by-products are directly used can be easily targeted at MIDI.

Exhibit 228: Current value chain of petrochemicals and chemical products in Bangladesh

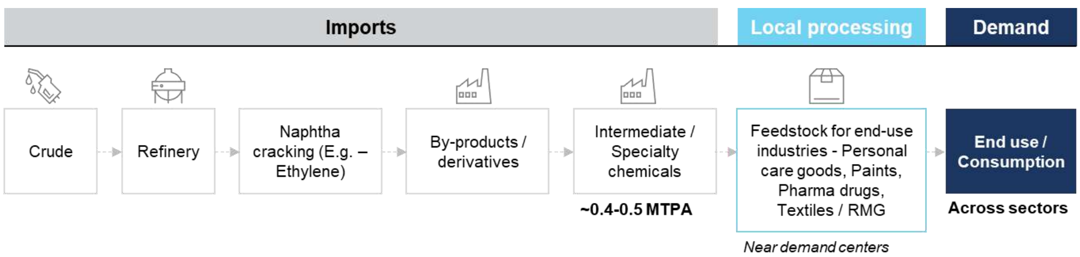
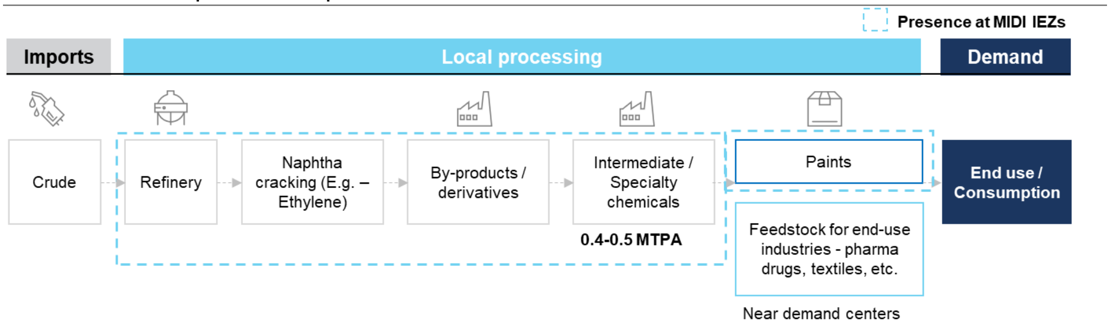


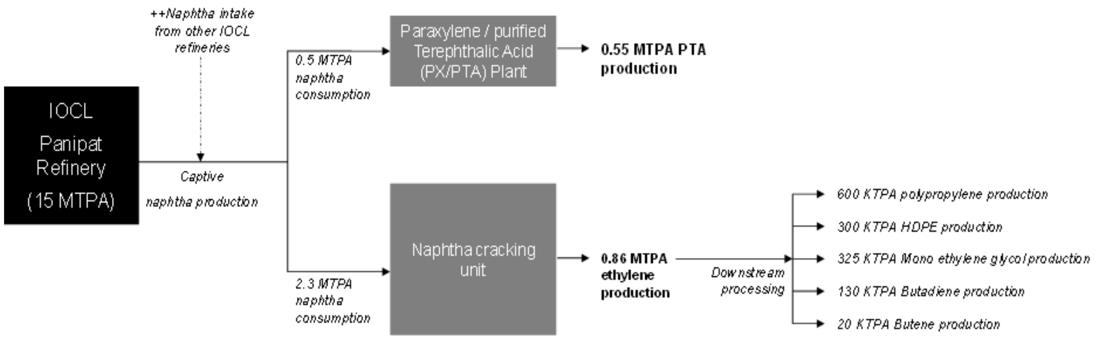
Exhibit 229: Proposed setup at MIDI



- **Land for petrochemical intermediates complex –** 80-100 acre of land may be setup for petrochemical intermediates, speciality chemicals and other petroleum derived chemical products.

Case in point: IOCL Panipat Refinery, India
Secondary units at Indian Oil Corporation Limited's 15 MTPA Panipat Refinery and their outputs are presented below as an illustrative example:

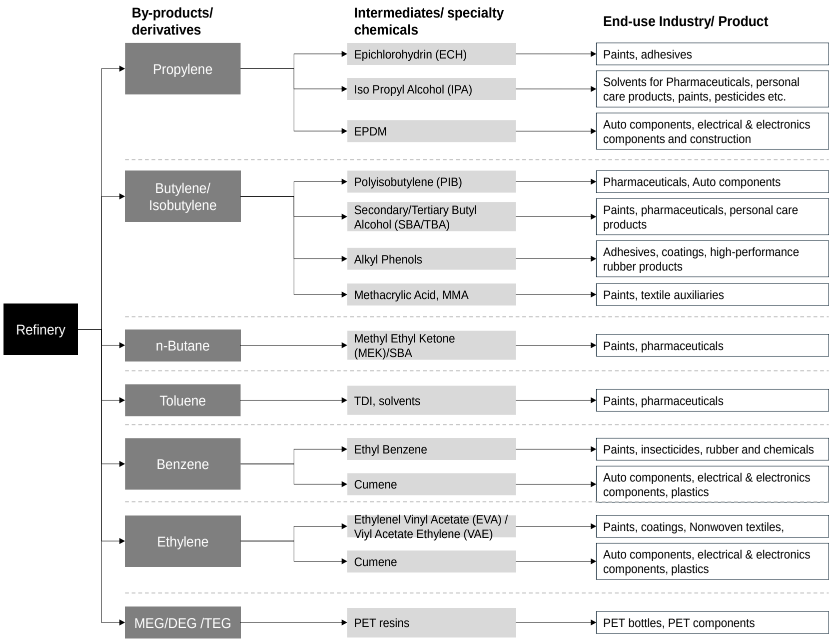
Exhibit 230: IOCL Panipat Refinery, India



Chemical products complex:

The graphic below shows some of the intermediate chemicals – whose manufacturing may be considered at MIDI (dependent on refinery crude feedstock, refinery design, ratio of refining and cracking outputs, etc.)

Exhibit 231: Value chain of chemical manufacturing at MIDI (Illustrative)



As illustrated in the graphic above, these intermediary petrochemicals can be further processed and utilized for various end uses. Hence, MIDI can house such end-use industries along with petrochemical intermediary industries.

One such end use industry of paints and coatings manufacturing has been detailed below as an illustrative case:

Case example: Paints manufacturing

Current market scenario

Paint requirement in Bangladesh is predominantly met through local production. This is also owing to the high custom duties and VAT on the import of finished products.

With a total market size of USD ~33 Mn and ~0.18 MTPA in volume (2019), the per capita consumption of paint in Bangladesh is ~1 kg per person, which is significantly lower than that of India, Middle East and developed nations.

Key players

More than 80% of the total paint market in Bangladesh is captured by 6 MNCs, namely, Berger Paints, Asian Paints, Nippon Paint, Jotun Paint, AkzoNobel (JV with ACI), and Kansai Nerolac.

The rest of the ~20% market is catered by specific local manufacturers in Bangladesh.

Raw materials for paint manufacturing

Bangladesh currently meets its raw materials requirement for paint manufacturing by imports. ~70% raw material requirement is currently being met by imports. Key raw materials include:

Raw material imports	% By volume
Monomers/ resins	~44%
Pigments / fillers / extenders	32%
Solvents	20%
Additives	4%

Bangladesh imports these raw materials from China, India, USA, ME, etc.

Future demand estimation

With a current per capita consumption at ~1 kg per person, Bangladesh can target to reach India equivalent by 2030, and Middle East equivalent by 2041.

Raw material imports	2030	2041
Targeted per capita consumption (kg p.a.)	3.5	6.7
Future Demand (MTPA)	0.6	1.3

Hence, the market can grow by ~7x by 2041.

Paints opportunity at MIDI

In case of establishment of upstream refining and intermediary chemical processing units at MIDI, the region will be well suited to house paints industry catering to captive and catchment demand.

The paint industry will benefit from domestically produced monomer resins and other chemicals produced in upstream refining and chemicals units.

MIDI can capture 0.1-0.2 MTPA paints manufacturing capacity by 2041 (10-15% of total capacity)

- **Capacity target – 0.1 – 0.2 MTPA**
- **Land required – ~80-120 acres**

Hence, overall chemicals opportunity at MIDI –400-500 acres; of which

- **Petrochemical intermediates complex – 80-100 acre**
- **Chemical products complex (e.g., paints, etc.) – 300 acres**

11.16.5. Automobile manufacturing and assembly complex

2-Wheelers

Current market analysis

Bangladesh witnessed a sale of ~4 lakhs 2-wheelers vehicles in 2019, of which ~20% were imported as CBUs.

Annual sales in 2019	~4 lakhs
Locally manufactured/ assembled	3.2 lakhs
Imported	0.8 lakhs

The current production capacity in Bangladesh is ~12 lakhs p.a.

Local manufacturing and assembly has rapidly grown owing to higher import duty on CBU imports. Major 2-wheeler brands in Bangladesh include TVS, Hero, Honda, Bajaj and Walton.

Future demand estimation

2-Wheeler ownership in Bangladesh is expected to rise from ~20 bikes per 1,000 to 265 bikes per 1,000 (Italy equivalent)[227].

Exhibit 232: Future demand estimation of 2-Wheelers in Bangladesh

	2021	2030	2041
Total number of 2W	33,76,000	1,30,61,000	5,05,29,000
Average number of 2W per year		13,06,000	50,53,000
Local assembly of motorcycles		**12,41,000**	**48,00,000**
Visible capacity		**12,00,000**	**12,00,000**
Gap (accounting for capacity utilization)		**3,40,830**	**39,00,000**

Competitiveness and Opportunity at MIDI

Owing to availability of skilled labour, local manufacturing is more suited for areas like Dhaka and BSMSN.

However, MIDI may house a SKD assembly plant owing to its proximity to deep sea container port which makes it better suited for knocked down 2 wheelers coming in containers.

- **Capacity target for MIDI by 2041 – ~1Mn 2W assembly**
    - Land requirement – ~90-110 acres
    - Power requirement – ~10-12 MW
    - Employment generation – ~2,400-2,600

MIDI can capture ~20% of Bangladesh's demand for 2-Wheelers in 2041

Passenger Vehicles

Current market analysis

Current PV market size in Bangladesh is estimated at BDT 5,000 Cr.

Market size (volume)	~5,40,000
Remodelled Japanese Car	~82%
Imported brand new cars	~16%
Locally assembled in Bangladesh	~2%

It witnessed a sale of ~20,000 passenger 4-W vehicles in 2020 (dominated by Japanese remodelled cars). The current production / assembling capacity in Bangladesh is very minor (<1,000 units p.a. for imported SKD units).

Future demand estimation

Market expected to move to local assembly on account of rising sales providing economies of scale and high duty on import of CBUs. Further, local assembly is expected to lead reduction in current high price of PVs and move Bangladesh market away from remodelled cars.

[227] India – 128 | Indonesia - 400

It is estimated that car ownership will rise from ~3.2 cars per 1,000 to ~34 cars per 1,000 (Vietnam equivalent)[228]

Exhibit 233: Future demand estimation of 4-W vehicles

	2021	2041
Total number of cars	5,39,000	64,70,000
Average number / year		24,31,000
Local assembly of cars[229]		2,00,000

Competitiveness and Opportunity at MIDI

Given proximity to deep sea container port, MIDI can capture assembly of imported SKD/CKD units. Hence, MIDI could target large OEM assembly plant for domestic car manufacturing.

- **Capacity target for MIDI by 2041 – ~0.1 Mn units' assembly**
    - Land requirement – ~90-110 acres
    - Power requirement – ~10-12 MW
    - Employment generation – ~2,400-2,600

MIDI can capture 20-25% of Bangladesh's demand for 4-Wheelers in 2041.

Road map for automobile assembly at MIDI

Parameters	2030	2035	2041
Capacity	1/2 2W manufacturing plants; low starting capacity expandable up to 5 lakh units each	Expansion of 2W manufacturing units + Setup of greenfield 4W assembly plant with starting capacity of 50,00 units p.a.	Two 2W assembly plants with annual output of 1 Mn units One 4W assembly plant with annual output of 1 lakh units
	2W - 2 lakh units 4W - NIL	2W - 6 lakh units 4W - 0.5 lakh units	2W - 10 lakh units 4W - 1 lakh units
Products / value chain	Automobile CKD / SKD assembly units for assembly of imported automobiles		
Enablers	1. Development of ancillary auto component cluster to provide low value inputs - especially for 4W assembly 2. Availability of skilled and semi-skilled labor - development of adequate social infra to attract talent 3. Favorable import duty structure to attract international OEMs to setup assembly units		
Cumulative Investment required (USD Mn, 2022 prices)	40-50	200-250	400-450
Target investors	Large international 2W and 4W OEMs can house CKD / SKD assembly units near the port. Potential investors for 2W - Honda, Hero, Bajaj, etc. Potential investors for 4W - Japanese 4W OEMs (Toyota, etc.) and Indian OEMs (Maruti Suzuki, Mahindra).		

[228] India – 22 | Vietnam – 34 | Thailand - 140

[229] 50% local assembly by 2041

11.16.6. Electronics complex

Consumer Durables

Current market analysis

Consumer durables mainly constitute of whitegoods (i.e., major appliances like washing machine, refrigerators), brown goods (i.e., consumer electronics like TV, laptops, etc.), small appliances (like toasters, coffee makers etc.). Current market size of consumer durables in Bangladesh is ~ USD 2.4 Bn growing with a CAGR of >14% over the past 5 years.

Currently, domestic assembly accounts for ~75% of the market, with manufacturing being concentrated in Dhaka-Gazipur region. Major local brands include Singer and Walton, while international brands include LG and Samsung.

Future demand estimation

As per the industry estimates, market is expected to grow by ~16% CAGR over 2021-2030.

Major drivers include:

- **Increasing electrification:** *>95% of population has access to electricity*
- **Increasing per capita GDP**: *USD 2,340 in 2020*
- **Increasing urbanization:** *~40% of urban population in 2020*

Other drivers: Policy support, consumer purchase financing, increasing smart phone penetration

Exhibit 234: Future demand estimation of consumer durables in MIDI

Size	2020	2030	2041
USD Bn	**2.35**	**10**	**37.6**
Growth		16% as per industry projections	13% 7.8% real GDP CAGR as per IEPMP + 5% Inflation CAGR

Competitiveness and Opportunity at MIDI

For end-to-end locally manufactured consumer durables:

Dhaka-Gazipur belt will continue to hold dominance due to existing industrial presence, skilled labour availability and market proximity.

For imported parts + assembly units:

MIDI will have advantage with port proximity. This can also convert into export opportunity for import + assembly & export.

Further, MIDI can cater to domestic demand of south Chittagong region. Hence, MIDI can target to house assembly units of international branded consumer durables in medium-long run.

In the long run, MIDI can house large consumer electronics assembly park with 3-4 large brands.

- **Capacity target for MIDI by 2041 – ~2 Mn units**
  - Land requirement – ~170-200 acres
  - Power requirement – ~22-25 MW
  - Employment generation – ~1,600-2,000

Smart phones and consumer electronics

Current market size for smartphones in Bangladesh is ~USD 1.2 Bn.

Exhibit 235: Current market scenario of Smartphones

Mn Units	Import +	Local manufacturing -	Exports =	Domestic demand
Total	**10.4**	**26.6**	**2**	**35**
Feature phone	*10.4*	*15.6*	*Minor*	*26*
Smart phone	*Minor*	*11*	*2*	*9*

Though majority of phones are manufactured locally, high end raw materials (like processor and chips) for cell phone manufacturing are imported.

Moreover, local manufacturing is encouraged by the government owing to its tax structure

- 1% tax rate for local manufacturing
- 15% tax / duty for locally assembled smartphones
- 57% tax / duty rate for imported smartphones

Currently, Bangladesh exports ~2Mn smart phones to USD, Nepal, etc. Hence, Bangladesh presents a huge opportunity for smartphone manufacturing to meet local demand + exports.

Future demand estimation

- Smart phone penetration is expected to rise in Bangladesh - 37% (2021)[230] to 70-80% (2041)
- Therefore, total number of smart phones in Bangladesh in 2041 – Expected 130-150 Mn
- **Hence, total demand for new phones – 50-60 Mn / year in Bangladesh**

Opportunity at MIDI

Dhaka and neighbouring areas have edge due to skilled labor and market proximity.

However, MIDI can target exports in next 10-15 years – with 1/2 large mobile phone manufacturing plant(s) (both domestic + export oriented).

- **Capacity target for MIDI by 2041 – ~10 Mn units**
    - Land requirement – ~40-60 acres
    - Power requirement – ~10-12 MW
    - Employment generation – ~500-600

MIDI can capture ~10% of Bangladesh's demand + equivalent exports in 2041.

[230] India – 43%, US – 72%, Indonesia – 65%, China – 60%

Road map for electronics park at MIDI

Parameters	2030	2035	2041
Capacity	NIL	3-4 consumer durable companies in electronics park 1-2 mobile phone manufacturer catering to domestic demand + exports	
		Consumer durables - 1 Mn units Smart phones - 5 Mn units	Consumer durables - 2 Mn units Smart phones - 10 Mn units
Products / value chain	-	Assembly of imported consumer durables, smart phones and other electronic products	
Enablers	-	1. Availability of skilled and semi-skilled labor - development of adequate social infra to attract talent 2. Favorable import duty structure to attract international OEMs to setup assembly units	
Cumulative Investment required (USD Mn, 2022 prices)	-	150-200	350-400
Target investors	-	International investors / OEMs interested to enter and establish base in B market. Large international mobile phone manufacturers, white goods brands - LG, Samsung, Sony, etc.	

11.17. Manufacturing hub – perspective on exports (Back-end)

This section is in continuation of export-oriented manufacturing section under the Manufacturing Hub chapter. Note that the list of export industries is illustrative and indicative since selection of export competitive industries is tied to Bangladesh's overall competitiveness in the global perspective.

11.17.1. Synthetic Fibres

Industry scenario

- Bangladesh's textiles and RMG sector primarily constitutes cotton apparels and related intermediate products (~75-80% including cotton yarn, fibre, and RMG / apparel)
- Given, the global shift of the industry to synthetic/ man-made fibres and related products, Bangladesh manufacturers are also shifting to in-house production of synthetic fibre such as polyester, VSF, Tencel etc. This shift is happening on 2 fronts:
    - Bangladesh players are manufacturing fabric and finished product from synthetic fibres
    - Bangladesh players are manufacturing synthetic fibres for direct exports to end use markets
- As per International Textile Manufacturer Federation, synthetic fibre contributes ~75% of the global apparel industry's demand

Bangladesh Competitiveness

- Bangladesh has a strong existing export base of textiles and RMG industry, which contributes ~80% of country's overall exports
- Bangladesh has already established itself as a prime sourcing destination for RMG for developed countries and multinational clothing brands. Hence, the country can easily pivot itself and expand to exports of synthetic fibre/ fabric / garments.
- Further, Bangladesh enjoys advantage of low-cost labour availability which can make synthetic textile / RMG cost competitive compared to its competitors

Opportunity at MIDI

- The increasing global demand for synthetic fibres is a great opportunity for the country to expand into a growing market
- Further, the post operationalization of refining, petrochemicals and polymer units the sector will have significant synergies with upstream industries at MIDI
- Further, MIDI will be able to provide ample power and LNG, making it a suitable location for the industry
- For this purpose, an integrated complex producing synthetic fibre and fabric may be set up at MIDI with focus on export of synthetic fibre and grey fabric as below.
    - Capacity - ~0.3-0.5 MTPA by 2041
    - Land – 200 acres
    - Employment – ~5,500-6,000 jobs by 2041

11.17.2. Plastic Products

Industry scenario

- Market size – ~USD 2.6 Bn
  - Domestic market – ~USD 2.5 Bn in 2020
  - Exports market – ~USD 100 Mn in 2020; major export destinations – USA, Canada, Europe, China, India and Nepal
- The industry is largely dependent on imported raw materials and a small part of raw materials requirement is met via domestic recycling
- While the direct export market is very limited, the market also consists of deemed export items[231] with >80% share overall exports

Bangladesh Competitiveness

- Duty-free market access to large export markets including Europe, UK, Japan, Canada, Russia and Australia
- Further, low labour cost also lends a strong competitive advantage for manufacturing an export of plastic products
- Supportive government incentives and policy
  - Provision of export subsidy (5-10%)
  - No restrictions on entry of foreign investors

Opportunity at MIDI

- Given, the growing size of plastics market (growing at a rate of 20%), the country can target to capture a larger share of the global market
- The industry's dependence on imports for raw materials and synergies with presence of plastic resins manufacturing at MIDI, makes it a suitable location for production of plastic products
- Further, MIDI will be able to provide ample power and LNG, making it a suitable location for the industry
- The target size for export-oriented plastic products manufacturing at MIDI is as below.
  - Capacity – ~0.3-0.5 MTPA by 2041
  - Land – ~100 acres
  - Employment – ~2,800-3,200 jobs by 2041

11.17.3. Ship Building

Industry scenario

Bangladesh is primarily a small ship vessel manufacturing country largely producing ships of <20,000 GT.

- Market size – More than ~USD 1 Bn, with a y-o-y growth rate of ~5%
  - Domestic market – ~185,000 GT (~75%)
  - Exports market – ~65,000 GT (~25%)
  - Major export destinations – Europe, Africa and Asia
- High dependence on imports for raw materials required for shipbuilding
  - Raw materials for inland waterways vessels are majorly sourced locally (~50-60%)
  - Raw materials for exports or ocean-going vessels are majorly imported (~80%)
- Currently, most shipyards in Bangladesh are concentrated along major rivers in Narayanganj and Chittagong – located in proximity of ship breaking and recycling yards
  - Further, these areas also house supporting industries such as steel, building materials, etc.

Bangladesh Competitiveness

- Existing strong base and established technology in the small vessel segment (MPVs, cargo feeders and passenger ferries)

[231] Direct export items include household plastic products, toys, polythene sheet, PVC pipe, PET bottle etc. Deemed export items include garment accessories such as hangers, buttons, clips etc. and packaging/ conveyance products such as sacks, bags, pellets, boxes etc.

- Labour cost competitiveness of 20-30% as compared to other countries, including both skilled and semi-skilled workers (labour cost competitiveness is particularly important for small vessel manufacturing where labour costs constitute a significant part of overall cost structure)
- Supportive government incentives and policy
    - Provision of export subsidy – 10% on export of ships
    - Policy support – Shipbuilding policy, 2020

Opportunity at MIDI

Given the ease of access to imported raw materials at Matarbari Port and presence of backward linkage industries such as steel, MIDI is suitable to house shipbuilding yard(s).

However, basis existing developed base of the industry, Bangladesh is expected to be competitive in small vessel manufacturing. Hence, 1-2 shipbuilding yards can be set up at MIDI with focus on export oriented small vessel manufacturing.

- Capacity – ~15-20 ships with 10-15,000 dwt per annum

Other industries like food processing, shrimp and fisheries, etc. may also be considered at MIDI from an export perspective.

11.18. Hinterland sufficiency

Exhibit 236: Hinterland Road and Rail connectivity to MIDI

In line with the forecasted port traffic and proposed industrial and manufacturing setup, the evacuation capacity and infrastructure for goods and cargo to and from MIDI will have to be reconsidered.

1. **Port Traffic**
   a. **Container Traffic**
      - Container traffic has been estimated at 4.4-5.2 Mn TEUs in FY41
      - Modal split of 50:50 has been considered for road and rail movement of container traffic *(in line with "Technical Assistance for Dhaka-Chittagong-Cox's Bazar Rail Project Preparatory Facility" Report)*
      - Hence in 2041
        - Container traffic by road – 2.2-2.6 Mn TEUs
        - Container traffic by rail – 2.2-2.6 Mn TEUs

   b. **Bulk and break-bulk traffic**
      - Bulk and break-bulk traffic has been estimated at 66-68 MTPA in FY41
      - Modal split of 70:20:10 has been considered for barge, road and rail movement, respectively. Larger share of barge movement is on account of composition of bulk traffic (cement clinker, grains, etc.) which are currently being distributed via waterways throughout Bangladesh.
      - Hence in 2041
        - Bulk and break-bulk traffic by barges – 47 MTPA
        - Bulk and break-bulk traffic by road – 13.5 MTPA
        - Bulk and break-bulk traffic by rail – 6.7 MTPA

2. **Manufacturing traffic**

Further, apart from the port traffic, significant traffic is also expected to emanate from proposed large industries to be setup at MIDI. Modal split of 50:50 has been considered for road and rail movement of manufacturing traffic.

In line with the above hinterland connectivity infra – including road and rail may have to be reconfigured.

A. Access Road

Currently a 26.7 km long greenfield road has been proposed between Matarbari and N1.

Total expected road traffic is as below:

Exhibit 237: Road traffic to MIDI, 2041

Port Traffic 2041[232]			
	Containers by road	*2.6*	*Mn TEUs*
Trucks / trailers movements for container traffic		2.6	*Mn*
	Bulk traffic by road	*13.4*	*Mn Tons*
Trucks / trailers movements for bulk traffic		0.9	*Mn*
Total truck movements / traffic		3.5	*Mn*
Daily truck movement		9,571	*trucks / day*
Daily PCU movement		28,712	*PCU / day*
Peak hourly PCU movement		**2,584**	***PCU / hr***
Manufacturing Traffic 2041			
Sector	Capacity	Traffic	
Plastics	1.3 MTPA	119	*trucks / day*
Steel	11.8 MTPA	1,078	*trucks / day*
Cement	10.6 MTPA	968	*trucks / day*
Fertilizers - urea	0.7 MTPA	64	*trucks / day*
Chemicals	1 MTPA	91	*trucks / day*
Automobile - 2 wheelers	1 Mn units	8	*trucks / day*
Automobile - 4 wheelers	1 lakh units	34	*trucks / day*
Electronics - consumer durables	2 Mn units	46	*trucks / day*
Electronics - smart phones	10.3 Mn units	14	*trucks / day*
Food processing - edible oil (soya)	0.6 MTPA	68	*trucks / day*
Food processing - sugar and salt	1.2 MTPA	110	*trucks / day*
Total manufacturing traffic		2,599	*trucks / day*

[232] 15 ton OR 1 TEU equivalent loading for trucks

Total manufacturing traffic	7,798	*PCU / day*
Hourly PCU movement	**325**	***PCU / hr***
Total projected port + manufacturing traffic	**~2,900**	*PCU / hr*

Further, this traffic will be supplemented by utility traffic, car traffic (employees and passer by traffic, etc.) and non-commodity MIDI EZ traffic. **This compares to only ~2,000 PCU / hr peak traffic[233] consideration used for design of access road** as per *"JICA preparatory survey for Matarbari Port Development Project December 2018".* **In context of higher port and manufacturing traffic, evacuation capacity of access road may be re-evaluated / enhanced for 2041 view.**

B. Railways

Currently, construction of new DG ST rail link with Matarbari has been proposed as an offshoot from Chakaria station on Chittagong-Cox Bazar line. In line with the forecast, the total expected road traffic is

[233] For FY35

Exhibit 238: Rail traffic to MIDI, 2041

Port Traffic 2041			
Container movement by rail		2.6	*Mn p.a.*
Daily movement by rail		7,123	*TEUs*
Container rakes / slots per day (single stack)[234]		78	*trains*
Daily movement by rail		6.7	*Mn T p.a.*
Bulk rakes / slots per day (single stack)[235]		7	*trains*
Total rakes / slots per day		**86**	***trains***
Container Manufacturing Traffic 2041[236]			
Sector	Capacity	Traffic (TEUs)	
Plastics	1.3 MTPA	119	
Chemicals	1 MTPA	91	
Automobile - 2 wheelers	1 Mn units	8	
Automobile - 4 wheelers	1 lakh units	34	
Electronics - consumer durables	2 Mn units	46	
Electronics - smart phones	10.3 Mn units	14	
Food processing - edible oil (soya)	0.6 MTPA	68	
Food processing - sugar and salt	1.2 MTPA	110	
Daily movement by rail		490	*TEUs*
Container rakes / slots per day (single stack)		5	*trains*
Total projected rakes / slots per day		**91**	*trains*

This compares to only **58 rakes / slots per day assessed capacity for Matarbari rail link lin**e as per *"Technical Assistance for Dhaka-Chittagong-Cox's Bazar Rail Project Preparatory Facility Report"*. **In context of higher port and manufacturing traffic, evacuation capacity of access railway may be revaluated, and DG ST track may suitably be upgraded as DG DT track for Phase II of the port.**

Further, currently only a DG ST track has been proposed on the Dohazari-Cox Bazar section of Chittagong-Cox Bazar line. Some passenger trains will also be plying this route. **Hence, cargo traffic will be further constrained by passenger expresses trains on Cox Bazar – Chittagong line. Hence, conversion of Dohazari-Chakaria stretch to DG DT track may be considered for Phase II of the port.**

[234] 91 TEUs per rake
[235] 2,500 tons per rake
[236] Bulk industries traffic already captured as part of bulk traffic for port

11.19. Sources

Exhibit 239: List of sources

#	Section/ sub-section	Data	Source			Page No.
3. MIDI Key Features and Current Status						
3.1.2	Existing land use plan and status	Multiple datapoints	• Land Use and Development Planning Survey of Moheshkhali and Matarbari Area • Revised Land Use Development Plan • Interaction with GoBD Ministries and Executing Agencies	2019	JICA	
3.1.3	Exhibit – Hinterland Connectivity Projects	Key connectivity projects and their status	• MIDI Projects List Monitoring • Interaction with GoBD ministries and Executing Agencies			
3.2.2	Bangladesh's Vision 2041	Multiple datapoints	Perspective Plan of Bangladesh 2021-2041	2020	Bangladesh Planning Commission, Ministry of Planning	
3.4.1	Bangladesh Competitiveness	GDP ~USD 460 Bn	GDP of Bangladesh 2021-2022 (P)	2022	Bangladesh Bureau of Statistics	
	Bangladesh Competitiveness	Per capita GDP - ~USD 2,450	GDP per capita (current USD) [Link to document]	2021	World Bank	
	Bangladesh Competitiveness	Ranking on Logistics Performance Index	International LPI [Link to document]	2018	World Bank	
	Bangladesh Competitiveness	Ranking on Ease of Doing Business	Ease of Doing Business Rank [Link to document]	2019	World Bank	
3.5	Case Learnings	Multiple datapoints	Refer to the sources for case learning annexure			
5. Pillar 1: Deep-sea Port & Logistics Hub						
5.1	Bangladesh current port scenario	Traffic: 3.2 Mn TEUs; 76 MT Bulk and break bulk; 10 MT liquid cargo	Data shared by CPA	Dec'22	Chittagong Port Authority	-
5.1	Bangladesh current port scenario	Data on other ports – Pyra and Mongla	• Interaction with CPA and other agencies • Multiple news articles and secondary sources			-
5.1.1	Constraints at Chittagong Port	Constraints bulk and breakbulk cargo	• Interaction with CPA • Interaction with logistics players – Doreen Group, etc. • Interaction with multiple bulk commodity traders – cement clinker, limestone, etc.			

#	Section/ sub-section	Data	Source			Page No.
			• Interaction with key industrial players – BSRM, etc.			
	Constraints at Chittagong Port	Constraints container cargo	• Interaction with CPA • Interaction with logistics players – Doreen Group, etc. • Interaction with key industrial players – Butterfly Group, etc.			
	Upcoming developments	Patenga and Bay Terminal	Interaction with CPA			
5.2	MIDI Competitiveness					
(A)	Movement of Bulk cargo via barges to Dhaka / Narayanganj					
-	Shipping freight and costs	Multiple datapoints	Assessing the Link between Vessel Size and Maritime Supply Chain Sustainable Performance [Link to research paper]	2021	MDPI	
-	Time and cost	Multiple datapoints	Meeting with trader of cement clinker	Jan'2023	P&P Enterprise	-
-	Time	Multiple datapoints	Meeting with C&F companies	Jan'2023	Tower Freight Logistics Limited Cargostar Bangladesh	-
-	Truck costs	Multiple datapoints	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
B	Movement of Bulk cargo via truck to Chittagong					
-	Shipping freight and costs	Multiple datapoints	Assessing the Link between Vessel Size and Maritime Supply Chain Sustainable Performance [Link to research paper]	2021	MDPI	
-	Time and cost	Multiple datapoints	Meeting with MD - BSRM	Jan'2023	BSRM (MD)	-
-	Time and cost	Multiple datapoints	Meeting with trader of scrap steel	Jan'2023	Steel Times Pvt. Ltd.	-
-	Time	Multiple datapoints	Meeting with C&F companies	Jan'2023	Tower Freight Logistics Limited Cargostar Bangladesh	-
-	Truck costs	Multiple datapoints	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
C	Movement of Container cargo to Dhaka / Chittagong					
-	Shipping freight and costs	Multiple datapoints	Assessing the Link between Vessel Size and Maritime Supply Chain Sustainable Performance [Link to research paper]	2021	MDPI	

#	Section/ sub-section	Data	Source			Page No.
-	Time and cost	Multiple datapoints	Meeting with Freight Forwarder	Jan’2023	BALT Ltd.	-
-	Time	Multiple datapoints	Meeting with C&F companies	Jan’2023	Tower Freight Logistics Limited Cargostar Bangladesh	-
-	Truck costs	Multiple datapoints	Meeting with freight companies	Jan’2023	Loop Freight & CFA Agents	-
5.3	Matarbari Traffic Projections	Base year 2021 Data	Data shared by CPA	Dec’22	Chittagong Port Authority	-
5.3	Matarbari Traffic Projections	IMF scenario: CAGR of 6.3% p.a. till 2041 In-between scenario: CAGR of 7.8% p.a. till 2041	Integrated Energy and Power Master Plan Project in the People's Republic of Bangladesh, Draft Final Report	Nov’2022	The Institute of Energy Economics, Japan	47
5.3.1	Container Traffic Projections	36% - addressable traffic at MIDI	Dhaka-Chittagong-Coxs Bazar Rail Project Preparatory Facility Final Feasibility Study Report		JICA	62
5.4.1	Port Ramp Up Plan	Multiple datapoints under - current port plan – number of berth and carrying capacity	• Land Use and Development Planning Survey of Moheshkhali and Matarbari Area • MIDI projects list monitoring • Interaction with CPA • Interaction with sectoral experts for capacity computations			
6. Pillar 2: Manufacturing Hub						
6.2.3	**Long Steel Manufacturing**					
(A)	Demand supply scenario					
-	Market size	8.5 MTPA (2020-21)	Fastmarkets article [Link to article]	Aug’2022	Fastmarkets	-
-	Import – flat steel	2.4 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
-	Import finished products	0.8 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
-	Installed steel capacity in Bangladesh	8.5-9 MTPA	Business review of Steel and Re-rolling Industry of Bangladesh [Link to document]	Nov’2020	Industrial Development Leasing Company of Bangladesh Limited (IDLC)	13

#	Section/ sub-section	Data	Source			Page No.
-	Scrap steel from Chittagong ship-breaking yard	~2 MTPA	3rd steel and raw material conference [Link to document]	Sep'2022	SteelMint	4
-	Import of ferrous waste & scrap, iron ingots	~3.7 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
-	Import of iron ore and other spongy ferrous products	~0.5 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
(B)	Competitiveness					
-	FOB cost	360 USD/ton	BSRM and steel trader interactions - import from US	Jan'2023	BSRM, Steel Times Pvt. Ltd.	-
-	Freight + inland logistics (including insurance)	100 USD/ton	BSRM and freight forwarder interactions	Jan'2023	BSRM, BALT Ltd, Steel Times, Tower Freight, Cargostar Logistics.	-
-	Customs TTI	20 USD/ton	National Tariff: 2022-2023 [Link to document]	2022-2023	National Board of Revenue, Bangladesh	-
	Operating costs	Breakdown of costs	Interaction with steel sector experts			
	Margins	~10%	Basis India and Bangladesh benchmarks			
-	Transportation cost up to Dhaka	17 USD/ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Cost efficiency at MIDI	Multiple datapoints	• Interactions with steel sector experts • Inhouse long steel manufacturing model			
	Current long steel selling price	USD 900 / ton	• Interaction with BSRM and S Alam • Multiple online sources for daily steel prices in Bangladesh			
(C)	Opportunity at MIDI					
	Land requirement	1,200-1,4000 acres	• Basis benchmarks in India, Bangladesh and other developing regions • Interaction with BSRM			
	Power requirement	~1 GW	• Basis benchmarks in India, Bangladesh and other developing regions • Interaction with BSRM			
	Employment	21,000-22,000	Basis India and Bangladesh benchmarks			

#	Section/ sub-section	Data	Source			Page No.
6.2.5	**Petrochemicals and Polymers Manufacturing**					
	Integration of refineries with petrochemical units	• 10-15% lower energy costs • 15-20% lower cash OPEX • 10-15% lower personnel cost • ~30-35% higher RoI • 5-10% higher utilization	Interaction with refining and petrochemical experts			
	Shell Bukom Case Study	Multiple datapoints	Company websites			
6.2.5.2	**Plastic Polymers**					
(A)	Demand supply scenario					
-	Total annual demand	~1-1.1 MTPA	Plastics Industry [Link to document]	Feb'2021	Bangladesh Investment Development Authority (BIDA)	2
-	Raw material sourced via domestic recycling	0.2-0.3 MTPA	The World Bank's article [Link to article]	Dec'2021	The World Bank	-
-	Recycling of used plastics	0.2-0.3 MTPA	Meeting Bangladesh's Plastic Challenge through a Multisectoral Approach [Link to article]	Dec'2021	The World Bank	-
-	Raw material sourced via imports	0.5-0.6 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
-	Imported finished products	~0.2 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
-	Domestic production of plastic products	• 50,000 + companies • 90% MSMEs • 60% located around Dhaka	Plastics Industry [Link to document]	Feb'2021	Bangladesh Investment Development Authority (BIDA)	2
-	Direct exports	USD 100-150 Mn	Plastics Industry [Link to document]	Feb'2021	Bangladesh Investment Development Authority (BIDA)	2
-	Deemed exports	USD 900 Mn	Plastics Industry [Link to document]	Feb'2021	Bangladesh Investment Development Authority (BIDA)	-
-	PVC demand	~0.4 MTPA	Meghna Group sets foot in global plastic raw materials market [Link to article]	Oct'2022	The Business Standard	-

#	Section/ sub-section	Data	Source			Page No.
-	PET demand	~0.2 MTPA	Meghna Group sets foot in global plastic raw materials market [Link to article]	Oct'2022	The Business Standard	-
-	Resin manufacturing in Bangladesh – Meghna Group	1.5 L ton PVC resin + 1 L ton PET resin	Meghna Group sets foot in global plastic raw materials market [Link to article]	Oct'2022	The Business Standard	-
-	Bangladesh per capita consumption	6-7 kg per person	Plastics Industry [Link to document]	Feb'2021	Bangladesh Investment Development Authority (BIDA)	2
(B)	Competitiveness					
	Case 1 costs	Direct import costs Ethylene – 1,050 PVC – 1,050-1,100 HDPE – 1,200-1,300	Secondary sources and pricing websites	Jan, Feb 2023	Polymer update	
	Case 2, Case3, and Case 4 costs	Multiple costing data points	Internal analysis Expert interactions	Feb 23		
(C)	Opportunity at MIDI					
	Land requirement		Basis benchmarks in India, Bangladesh and other developing regions			
	Employment					
6.3	Perspective on Exports					
	Logistics competitiveness	Ranking on Logistics Performance Index	INTERNATIONAL LPI [Link to document]	2018	World Bank	
	Ease of Doing Business	Ranking on Ease of Doing Business	Ease of Doing Business Rank [Link to document]	2019	World Bank	
	Attracting FDI	Bangladesh FDI – 1% of GDP	Article – why is foreign direct investment so low in Bangladesh [Link to document]	2021	The Daily Star	
	Attracting FDI	Multiple datapoints - Bangladesh and Vietnam Comparison	Article Bangladesh lags behind Vietnam in reforms to attract FDI [Link to document]	2021	The Daily Star	
6.3.1	Pharmaceutical complex	Multiple datapoints under: • Industry snapshot • Market size of pharma and API • Bangladesh competitiveness	Pharma and API Industry Report [Link to document]	2020	Bangladesh Investment Development Authority (BIDA)	

#	Section/ sub-section	Data	Source			Page No.
6.3.1	Opportunity at MIDI – land area	200-220 acres	Basis benchmarks in India, Bangladesh and other developing regions			
6.3.1	Opportunity at MIDI – employment	3,600-3,700	Basis benchmarks in India, Bangladesh and other developing regions			
7. Pillar 3: Power and Energy Hub						
7.1.1	Bangladesh power demand	• ~333 TWh translating to 50 GW by 2041 • 91 TWh in 2021	Integrated Energy and Power Master Plan Project in the People's Republic of Bangladesh, Draft Final Report	Nov'2022	The Institute of Energy Economics, Japan	38
7.1.1	Exhibit- Bangladesh power demand projections	Multiple datapoints on estimated power generation (TWh)	Integrated Energy and Power Master Plan Project in the People's Republic of Bangladesh, Draft Final Report	Nov'2022	The Institute of Energy Economics, Japan	38
7.1.1	Exhibit- Bangladesh power demand projections	Multiple datapoints on expected installed capacity (GW)	Integrated Energy and Power Master Plan Project in the People's Republic of Bangladesh, Draft Final Report	Nov'2022	The Institute of Energy Economics, Japan	132
7.1.2	Exhibit- Power Generation Sources	Multiple data points on – land area, PLF, LCOE, CAPEX, Emissivity	Basis industry and expert interactions			
8. MIDI's Configuration						
8.1.2	Exhibits – Major ports on Indian West Coast	Capacity of multiple ports • Mundra – 264 MTPA • Kandla – 267 MTPA • Mumbai – 79 MTPA • JNPT- 139 MTPA • Mormugao – 63 MTPA • New Mangalore – 105 MTPA • Cochin – 78 MTPA	• Various port websites • Publications by Ministry of Shipping, Government of India			
8.2.1	Configuration across scenarios	Multiple datapoints for: existing land use for port, power and manufacturing hub	• Area allocated to various projects under - Land Use and Development Planning Survey of Moheshkhali and Matarbari Area • MIDI projects list monitoring • Interaction with relevant GoBD departments and agencies			
9. Impact Assessment						

#	Section/ sub-section	Data	Source			Page No.
9.1	Logistics cost savings will reduce cost of commodities	Reduction in cost of LPG cylinder by ~50 Taka	Article – BPC plans to build new LPG terminal at Matarbari [Link to document]	2020	The Financial Express	
9.1	Investments into port	Port Phase I Stage I – USD1,000 Mn	As per data received from JICA			
9.3	Power generation investments	Coal - Matarbari (including port side infra) – USD 6,200 Mn	Actual investment data received from JICA			
9.4.1	Core infra investments	Access rail from Chakaria (26 km) – USD ~1.5 Bn	Basis interaction with Ministry of Railways			
9.4.3	Ecotourism zone at Sonadia	Multiple datapoints	Feasibility Study for the Economic Zone Site in Sonadia, Moheshkhali			
9.6.1	Introduction to NER	NER – 9% of India's population; 3% of India's GDP	Ministry of Development of North-eastern Region, Government of India			
All other sources and computation methodology for impact estimation included as footnotes in the chapter itself						
10. Roadmap to 2041 – no separate sources; all data derived from other existing analysis from the report**.**						
11. Annexures						
11.2	MIDI – List of projects	Project outline, details and status	• MIDI Projects List Monitoring • Interaction with GoBD ministries and Executing Agencies	June'22 (MIDI projects list)	JICA and multiple meetings	-
11.3	MIDI – Land use Plans	• Long term land use plan – MIDI • Projects list and status • Land area allocation to various projects	Land Use and Development Planning Survey of Moheshkhali and Matarbari Area	2019	JICA	329 A11-2 11-25
		Revised land use plan	"Industrial and Economic Zones Sector Development Plan" (IEZ-SDP) for Moheshkhali - Matarbari Integrated Infrastructure Development Initiative (MIDI) – Revised LUP	Jan'2021	JICA, BEZA	-
11.4	Project master plans	MIDI – Power plant master plan	Meeting with CPGCBL	Nov'2022	-	-
		MIDI – Port (Phase 1, Stage 1) Master Plan	Preparatory Survey on Matarbari Port Development Project in the People's Republic of Bangladesh, Final Report	Dec'2018	JICA	2-59
		MIDI – Superdyke Plan	Presentation – Brief for JICA on Superdyke	Sep'2022	-	-
11.5	Site Visit Report	Multiple datapoints and site updates/ pictures	Site Visit – Primary	Feb'2023	Team	-

#	Section/ sub-section	Data	Source			Page No.
11.6	Sonadia Island – Eco-tourism park	Multiple datapoints	Feasibility Study for the Economic Zone Site in Sonadia, Moheshkhali	July'2020	BEZA	156
11.7	Ongoing/ committed projects in MIDI	Multiple datapoints	• Land Use and Development Planning Survey of Moheshkhali and Matarbari Area • Interaction with GoBD ministries and Executing Agencies	2019	JICA	-
11.8	Proposed water supply to Matarbari region	Water supply map	Data Collection Survey on Water Resources Development in Southern Chattogram	Aug'2022	JICA	S-38
11.10.1	Key takeaways from Integrated Energy Power & Master Plan	Multiple datapoints	Integrated Energy and Power Master Plan Project in the People's Republic of Bangladesh, Draft Final Report	Sep'2022	The Institute of Energy Economics, Japan	-
11.10.2	Key takeaways from Perspective Plan 2041	Multiple datapoints	Perspective Plan of Bangladesh 2021-2041	2020	Bangladesh Planning Commission,Ministry of Planning	-
11.11	Bangladesh's competitiveness	Ranking on Ease of Doing Business	Ease of Doing Business Rank [Link to document]	2019	World Bank	-
11.12	Long list of countries for benchmarking	Per capita GDP	GDP per capita (current USD) [Link to document]	2021	World Bank	-
11.13	Detailed Case Learnings					
11.13.1	Mundra Port & SEZ, India	Multiple data points	Annual Report [Link to document]	2020-2021	APSEZ Ltd.	-
			Adani Ports website	-	Adani ports & logistics	
			[News article]	2022	The Economic Times	
			Adani Power [Link to website]	-	Adani Power	
			Mundra Port Information Booklet [Link to document]	2020	APSEZ Ltd.	
			Environment Impact Study and Risk Assessment [Link to document]	-	Mundra SEZ Ltd.	
			India's coal imports [Link to article]	2022	Ministry of Coal	
			Mundra International Container Terminal [Link to document]	2019-20	DP World	
			Mundra's Port History [Link to article 1]	2021	Good Returns, Falcon Freights	

#	Section/ sub-section	Data	Source			Page No.
			[Link to article 2]			
			India’s container throughput [Link to website]	2020	CEIC	
			Investor Document	2011	Indbank	
11.13.2	Tanger Med, Morocco	Multiple datapoints	Annual Report [Link to document]	2020	Tanger Med Special Agency	
			Final figures of the port activity [Link to website]	2021	Tanger Med Website	
			Tanger Med Website [Link to website]	-	Tanger Med Website	
			Tanger Med automotive city [Link to website]	-	Tanger Automotive City	
			Railway activity at Tanger Med [Link to website]	-	Tanger Med Ports	
			[News article]	2020	Market insights upply	
			Morocco’s container throughput [Link to website]	2020	CEIC	
			[News article]	2021	Smart Maritime Network	
			[News article]	2022	Atalayar	
			[News article]	2019	Reuters	
			[News article]	2019	Morocco World News	
11.13.3	Map Ta Phut, Thailand	Multiple datapoints	Annual Report [Link to document]	2021	IEAT	
			IEAT Website [Link to website]	-	IEAT	
			Roles and Responsibilities [Link to website]	-	IEAT	
			Map Ta Phut Website [Link to website]	-	Map Ta Phut Port office	
			Map Ta Phut project document [Link to document]	-	JICA	
			Map Ta Phut report [Link to document]	1983	JICA	
			[Link to research paper]	2018	Research gate	

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			[News article]	-	Asian Engineering Consultants	
			[Link to article]	-	World Port Source	
			[Link to research paper]	2012	Journal of Social and Development Sciences	
			[Link to article]	1989	World Maritime University	
			[Link to document]	2017	Case research Journal	
			Eastern Seaboard Development Plan Impact Evaluation [Link to document]	1999	JICA	
			[News article]	-	Hydrocarbons Technology	
			[News article]	2019	Power Technology	
			[News article]	-	Power Info Today	
			[News article]	2021	Offshore technology	
			Glow SPP Website [Link to website]	-	Glow group	
			Terminal at Map Ta Phut [Link to website]	-	Map Ta Phut Tank Terminal Co Ltd.	
			[EEC Website]	-	Eastern Economic Corridor	
11.13.4	Bintulu, Malaysia	Multiple datapoints	Bintulu Development Authority [Link to Website]	-	Bintulu Development Authority	
			Annual Report [Link to document]	2021	Bintulu Port Holdings Berhad	
			RECODA [Link to website]	-	RECODA	
			Bintulu Port Website [Link to website]	-	Bintulu Port Sdn. Bhd.	
			Samalaju Port Website [Link to website]	-	Samalaju Port Authority	
			[News article]	2017	Bintulu Port Sdn Bhd.	
			[News article]	2011	The Star	
			[Link to article]	2022	Wikipedia	
			[News article]	2022	LNG Prime	

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			[News article]	2022	Borneo Talk	
			[News article]	2021	Hydrocarbons Technology	
			[News article]	2022	Power Technology	
			[News article]	2021	Pressreader	
			[News article]	2008	Asean Ports Association	
			[News article]	2022	Malaysian Investment Development Authority	
11.14	Manufacturing and trade in Bangladesh	Total national output	Survey of Manufacturing Industries [Link to document]	2019	Bangladesh Bureau of Statistics	71 onwards
11.15.2	Sector selection for exports diversification at MIDI	Long list of sectors	National Industrial Policy and Perspective Plan of Bangladesh 2021-2041	Sep'2022 and 2020	Ministry of Industry and Bangladesh Planning Commission, Ministry of Planning	-
		Statutory monthly minimum wages (high-low range) for major garment producing countries	Global comparative study on wage fixing institutions and their impacts in major garment producing countries [Link to document]	Sep'2016	International Labour Organization	13
		Relative comparison of labour intensity in select manufacturing sectors in Bangladesh	Industry interactions	2022-23		-
		Sector-wise logistics and energy intensity	Industry interactions	2022-23		-
11.16.1	**Cement**					
	Current BD demand	~33-34 MTPA	Cement industry current market update [Link to document]	Jan'21	Industrial Development Leasing Company of Bangladesh Limited (IDLC)	16
	Per capita consumption of BD	~198 Kg p.a.	BCMA Website	-	Bangladesh Cement Manufactures Association	
	Per capita consumption of other countries	• World average – 560 Kg p.a. • India – 312 Kg p.a. • Thailand – 500 Kg p.a. China – 1,700 Kg p.a	Cement industry current market update [Link to document]	Jan'21	Industrial Development Leasing Company of Bangladesh Limited (IDLC)	16
	Imports	• Portland cement slag: 25.5 MTPA Limestone flux: 8.6 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-

#	Section/ sub-section	Data	Source			Page No.
	Grinding capacity within Bangladesh	~58 MTPA	News article	2020	The Daily Star	-
	Regional consumption	• Dhaka - ~45% • Chittagong – ~23% • Rajshahi & Rangpur - ~10% • Khulna - ~10% Sylhet - ~7%	Annual Report [Link to document]	2021	Meghna Cement – Bashundhara Group	52
	Cement elasticity	1.1	News articles [Link to article] [Link to article]	-	-	-
	FOB cost	Limestone chips (UAE) – 7 USD/ton Clinker (Indonesia) – 32 USD/ton	Meeting with trader of cement clinker and C&F companies	Jan'2023	P&P Enterprise, Tower Freight Logistics Limited Cargostar Bangladesh	-
	Freight charges	Limestone chips (UAE) – 8 USD/ton Clinker (Indonesia) – 14 USD/ton	Meeting with trader of cement clinker	Jan'2023	P&P Enterprise	-
	Ship unloading and port dues charges	1 USD/ton	Meeting with trader of cement clinker	Jan'2023	P&P Enterprise	-
	Customs TTI	Limestone chips (UAE) – 14 USD/ton Clinker (Indonesia) – 8 USD/ton	National Tariff: 2022-2023 [Link to document]	2022-2023	National Board of Revenue, Bangladesh	-
	Truck loading charges	3 USD/ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Transport cost to factory	3.5 USD/ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Truck unloading charges	3 USD/ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Processing cost	16 USD/ton	Bangladesh benchmarks	-	-	-
	Operating margin	17 USD/ton	India and Bangladesh benchmarks	-	-	-
	Transportation cost up to nearby consumption centre	3.5 USD/ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
11.16.2	**Edible Oil**					
	Oil consumption	• Palm oil: 1.5-1.6 MTPA, 2020 • Soyabean oil: 1.2 MTPA, 2020 Others: 0.2 MTPA, 2020	Bangladesh Edible Oil Refining Sector: A Potential Destination for Malaysian FDI [Link to article]	2020	Malaysian Palm Oil Council (MPOC)	-

#	Section/ sub-section	Data	Source			Page No.
	Imports in FY 21	• Total imports – 1.5 MTPA Crude palm oil - <0.2 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
	Soyabean Oil - Trade	Crude soyabean oil import – Argentina (75%), Paraguay (13%), Brazil (9%) Soyabean import – USA (43%), Brazil (36%), Canada (14%)	Oilseeds and Products Annual [Link to document]	Mar'2022	United States Department of Agriculture	-
	Freight charges	USD 55 / ton	BSRM and freight forwarder interactions	Jan'2023	BSRM, BALT Ltd.	-
	Ship unloading and port dues charges	USD 1 / ton	Meeting with trader of cement clinker	Jan'2023	P&P Enterprise	-
	Customs TTI	NIL	National Tariff: 2022-2023 [Link to document]	2022-2023	National Board of Revenue, Bangladesh	-
	Truck loading charges	USD 1 / ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Transport cost to factory	USD 2 / ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Truck unloading charges	USD 1 / ton	Meeting with freight companies	Jan'2023	Loop Freight & CFA Agents	-
	Total processing cost	USD 566 / ton	India and Bangladesh benchmarks	-	-	-
11.16.2	**Sugar Refining**					
	Demand	~2.2-2.3 MTPA	Bangladesh hikes price of local sugar by Tk 14 a kg [Link to article]	Nov'22	BDNews24	-
	Import of white sugar	~0.1 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
	Imports of raw cane sugar	2-2.1 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
11.16.2	**Salt Refining**					
	Salt demand	~2.3 MTPA	Salt production hits 61-year high [Link to article]	May'2022	The Daily Star	-
11.16.3	**Fertilizers**					
	Demand	• Urea: ~2.5-3 MTPA • DAP: ~1.5 MTPA • TSP: ~0.7 MTPA	Demand, Production, Import & Consumption situation of Urea, TSP, DAP & MOP Fertilizer for last Fifteen years in Bangladesh	2021	Bangladesh Fertilizer Association (BFA)	1

#	Section/ sub-section	Data	Source			Page No.
		MOP: ~0.7 MTPA	[Link to document]			
	Fertilizer consumption	• China - ~350 kg/Ha • Bangladesh - ~286 kg/Ha • UK - ~243 kg/Ha • India - ~170 kg/Ha US - ~124 kg/Ha	Fertilizer use per ha of cropland [Link to website]	2019	Food and Agriculture Organization of the United Nations	-
	Import	• Urea: ~1.1 MTPA • DAP: ~1.4 MTPA • TSP: ~0.8 MTPA MOP: ~0.6 MTPA	Demand, Production, Import & Consumption situation of Urea, TSP, DAP & MOP Fertilizer for last Fifteen years in Bangladesh [Link to document]	2021	Bangladesh Fertilizer Association (BFA)	1
	Existing production	~1.3 MTPA	Demand, Production, Import & Consumption situation of Urea, TSP, DAP & MOP Fertilizer for last Fifteen years in Bangladesh [Link to document]	2021	Bangladesh Fertilizer Association (BFA)	1
11.16.4	**Petrochemicals and chemical products**					
	Inorganic chemicals	Import: ~1.9 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
	Inorganic chemicals	Demand: ~1.7 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
	Organic chemicals	Import: ~0.4 MTPA	Foreign Trade Statistics of Bangladesh [Link to document]	2020-21	Bangladesh Bureau of Statistics	-
	Availability of by-products and derivates + Graphic	Propylene, ethylene, butylene, n-butane, toluene, etc.	Interaction with in-house Oil and Gas and Refining Experts	2023	Sector Experts	-
	Paints market analysis: current market and future projections	Multiple datapoints	Report on paints in BD [Link to document]	2019	Bangladesh Paints Manufacturer Association	-
	Raw material requirement for paints	Multiple datapoints	Interaction with Mr Anjan Sircar, Currently MD Berger Paints Nigeria and Ex CEO Aqua Paints Bangladesh	Jan'2023	Interaction with Mr. Anjan Sircar	-
11.16.5	**2-wheelers**					
	Sold in 2019	~4 lakh	Business review of Commercial vehicle industry: rolling the wheels of economic growth [Link to document]	2021	Industrial Development Leasing Company of Bangladesh Limited (IDLC)	10
	Passenger vehicles					